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# The Iron is Hot

AFTER a long and depressing period during which her aircraft industry was unable to produce a competitive civil airliner, Britain has quite suddenly found herself in the position of having several very important prototypes of which two in particular, the Comet and the Viscount, may fairly be termed world-beaters. In one sense all of us are a little surprised at this turn of affairs, so refreshing amidst the frustration of our present humdrum existence, and there is some doubt as to whether we are fully prepared to take advantage of the situation as it and our national economy demand.

America will be quick to set about making up for her present lack of turbojet or turboprop airliners, but "quick" in terms of aircraft construction cannot mean less than two years. Though we shall not stand still during that period—far from it—we may not again find ourselves in the present position of having something unique to offer. Present efforts must be intensified without delay, and by all the means available, this country must endeavour to gain a foothold in world markets for civil turbine transports. To break into these markets, and particularly into the American home market, is by no means easy, but the British industry was never better equipped to do so. Moreover, currency is, for once, greatly in our favour. At the time of the Farnborough Exhibition, Sir Roy Dobson, S.B.A.C. president, came straight to the point in telling visitors that the display was not held for fun or to show off aircraft. "We want your orders," he said.

It must be expected that competitors will systematically talk down the advantages of British turbine-powered airliners and play upon any shortcomings there may be. This is accepted practice which should be anticipated and offset. The very volume of discussion and comment now current in America may be taken as indicative of the concern felt within that country's aircraft industry, even though the sense of it may be in contradiction.

Much has been made of the problems arising from differences of detail equipment and standards—for example, the disparity in screw threads. It is true that there are problems of this description, but they have been faced often enough before, both in war-time and on each of the many occasions when the world's principal operators have bought their aircraft abroad, and on no occasion have they proved so formidable as we are now led to believe. To-day, all aircraft are backed by a comprehensive spares organization, and it is a matter of hours to re-set a thread-grinding machine from the production of one size to that of another; in any case, the introduction of the Unified Thread has been agreed in principle.

Although few people have as yet been privileged to ride in the Comet, a very large number have sampled the outstanding qualities offered to passengers by the Viscount. We have yet to hear of anyone who was left unimpressed by its qualities in this category. From the economic point of view, the most important single fact is that the Viscount as well as the Comet have been ordered for service with the British Corporations, which have recently shown themselves to be particularly shrewd over such matters. Such home orders are an invaluable talking-point and an endorsement of the manufacturers' own performance figures. At long last, too, the airline-travelling public is beginning to show a critical interest in the speed, comfort and silence of the vehicles in which it rides. This tendency is one that can be turned to the particular advantage of this country by acquainting prospective travellers at first-hand with the great advances that will follow the introduction of the jet airliners which, for the time being, this country alone can offer.

We believe that to many people—particularly in countries where the art or science of publicity has been developed until it has almost the power of a drug—actions speak loudest of all. With this in mind, and in the belief that an aircraft with outstanding qualities will go a long way towards selling itself, *Flight* will do all in its power to support those people who have for some time past advocated sending British aircraft such as the Viscount, and later the Comet, for demonstration abroad as soon as it is a practicable possibility.

# COLLECTING a STRATOCRUISER

## How B.O.A.C. Take Delivery of Their Boeing 377s : Acceptance Negotiations : Conserving Dollars : Services to Commence Next Week

By the EDITOR

IN a few days' time British Overseas Airways Corporation will introduce a second type of American airliner on their North Atlantic services. Long overdue, but no less welcome to the operators for that reason, the B-377 Stratocruiser, made by the Boeing Airplane Company in Seattle is the latest and most advanced of many large transports to emerge from America and equip some of the world's foremost airlines. In this country we are depending upon the Stratocruiser to attract substantial bookings for B.O.A.C., and while it is naturally a matter for regret that our own new equipment must thus, once more, come from abroad, there is good reason to believe that these fine aircraft will prove a most popular and valuable addition to the B.O.A.C. mainline fleet.

The latest stratocruiser to join the two already here is named *Caledonia;* it is the flagship of the fleet and is the first B.O.A.C.-planned aircraft of this type. Handed over at Seattle on November 15th complete in every detail, it departed at once on its acceptance-cum-proving-flight, which terminated at Filton, B.O.A.C.'s new maintenance base. Only an acceptance check-over, now in progress, is required before *Caledonia* is ready in all respects for service on the North Atlantic route.

Lest it be thought that purchasing and taking delivery of a large airliner is a routine business accomplished in a matter of a few weeks, it will not be out of place to review here some of the intricate processes of negotiation, financial, technical and operational, which are necessary between the taking of the decision to buy the aircraft and the final moves in putting it into service.

Sanction having been obtained, negotiations for the purchase of Stratocruisers were opened in the early autumn of 1946. A contract was signed on October 18th of that year by Mr. Vernon Crudge re-

A B.O.A.C. Stratocruiser taxies out on the Boeing airfield at Seattle. The B-50D in the background is one of a great fleet sharing both sides of the taxying strip with the 377s; the value of the whole line-up was at that time estimated as £70 million

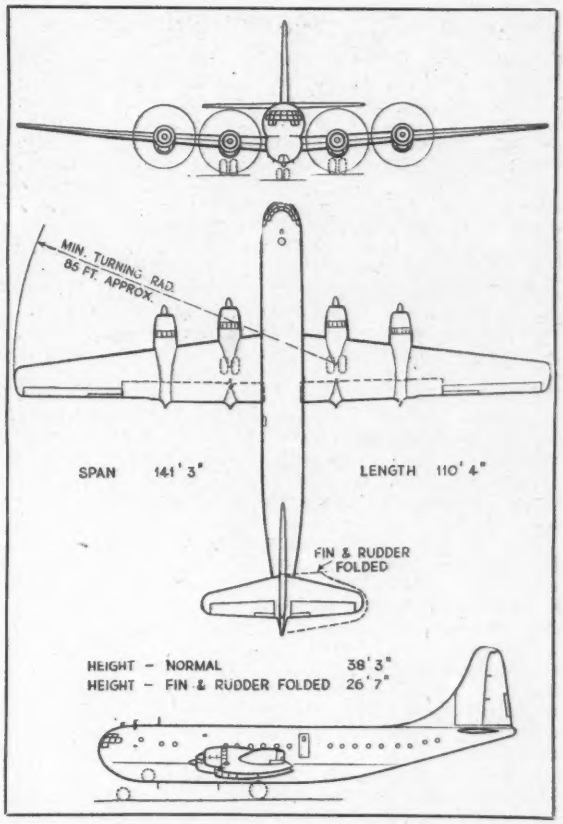
presenting B.O.A.C. (his title now is general manager, North Atlantic Division) and Mr. Wellwood E. Beall, vice-president, sales and engineering, Boeing Airplane Co., Ltd. The delivery dates had subsequently to be modified due to a prolonged strike at the makers' plant but some of the time has been made up and B.O.A.C. should have at least five of their fleet by the new year and all ten within the following month or so. The original order was for six, and four more were taken over from a Swedish company, this arrangement being concluded as recently as last April.

In all, approximately sixty Stratocruisers have been ordered by operators, and production is almost complete. Rather more than half the number has been delivered to date. Incidentally, the military transport version of the Stratocruiser, known as the C-97, is similar in all essentials, but the interior layout is, of course, entirely different and a large rear loading ramp is provided under the tail. C-97s are operated by M.A.T.S.—Military Air Transport Services of the U.S. Air Force.

To digress for a moment, it must be recorded that

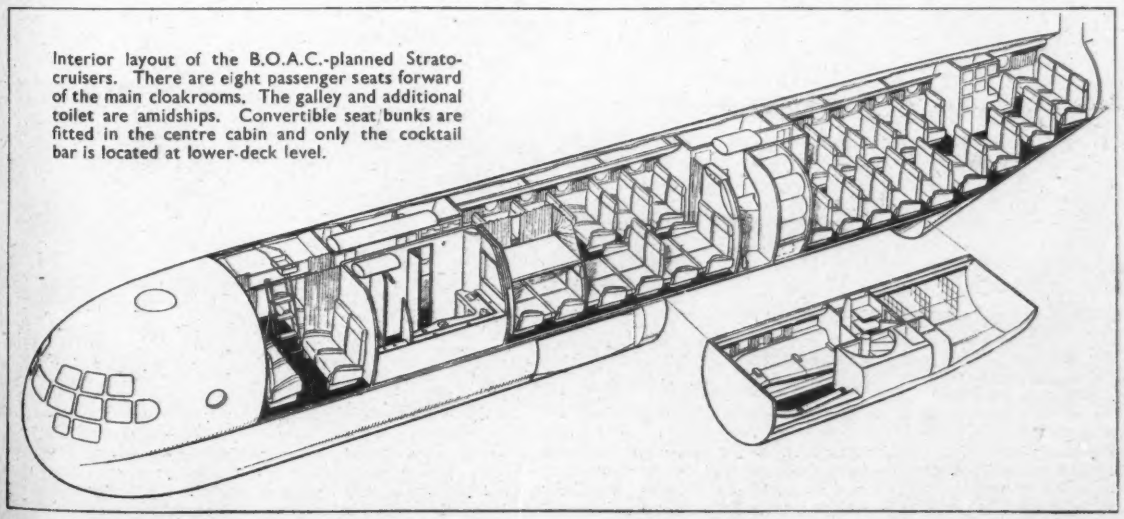
*WHEN the Editor was in Canada recently, he was able to avail himself of an opportunity to return to this country on the latest B.O.A.C. Stratocruiser delivery flight, and he therefore travelled to the Boeing works at Seattle in order to join "Caledonia." In this and future articles, he describes the negotiations leading up to a major equipment-purchase of this kind, the taking-over of the aircraft, crew-training and the Atlantic flight itself*

the first company to order Stratocruisers was Pan American Airways, and to them both Boeing and B.O.A.C. readily give full credit for several important changes in specification and for ingenious improvements based on their experience and embodied in these aircraft as a result of their co-operation at the very early stages. Pan American point out that, to the manufacturer, an aircraft is primarily the fuselage, wings, control surfaces and inside installations. "He takes pains," they say, "over selecting engines and airscrews, but they are not his design responsibility. Interiors he regards as a necessary evil." The airline executive, however, has in a sense (and rightly) the layman's view. "The aeroplane to him is always the completed flying machine with which he hopes to fulfil his responsibilities to the travelling, shipping and letter-writing public. Seen in this light, the period of contract negotiations with the airline considering the aircraft as a whole is without doubt the most important in the history of any new flying machine. On the part of the airline it is also a time when large sums of money must be committed as down payments in what is an act of faith that the unborn aeroplane will justify itself. In Pan American's case, a down




payment of more than six million dollars was required, and more than seven million dollars was actually paid before the first aeroplane was delivered."

It was at the instigation of Pan Am., for example, that the original proposition made by Boeing in June, 1944, for an aircraft of 120,000 lb gross weight with a speed of 280 m.p.h., fuel capacity of 5,700 gallons and engines of 2,200 maximum h.p., underwent a series of amendments. As a result, Pratt and Whitney engines of 3,500 h.p. were substituted, the fuel capacity was increased in stages by nearly 2,000 gallons, and the all-up weight was increased to 135,000 lb. Subsequently it rose to the present all-up weight of 142,500 lb. During this time the top speed was increased by 60 m.p.h. to 340 m.p.h. Some of the altera-



Interior layout of the B.O.A.C.-planned Stratocruisers. There are eight passenger seats forward of the main cloakrooms. The galley and additional toilet are amidships. Convertible seat bunks are fitted in the centre cabin and only the cocktail bar is located at lower-deck level.

## COLLECTING A STRATOCRUISER . . .

tions and improvements came as a result of research on Boeing's B-50 bomber, which is closely related to the Stratocruiser and with which it has many components in common. It was directly due to investigations into the installation of Pratt and Whitney Wasp Majors in the B-50 that their inclusion in the 377 design could be agreed to. The inclusion of General Electric turbo-superchargers was also a result of military experience, and Pan American were satisfied that important fuel economies could result from the use of such superchargers at high altitudes. They pointed out that their installation in military aircraft had produced a 10 to 20 per cent increase in speed as well as an increase in operational altitude. The turbo-supercharging system for the Wasp Major was incorporated in the 377 specification on January 4th, 1945.

In the case of B.O.A.C., what is called a "middle of the road" sales contract was signed with Boeing which was neither too loose nor too restrictive at the early stage on the manufacturer. The full aircraft specification was an appendix to the contract. The round-figure cost of Stratocruisers, which is more or less the same for all purchasers, is 1,600,000 dollars. There are escalation clauses covering such things as labour costs and bought-out items.

B.O.A.C. has gone to a great deal of trouble to save dollars wherever possible; to quote an example, there was, at the time of signing the contract, a 3 per cent sales tax in the State of Washington. On some £500,000 per aircraft this was a considerable sum, so arrangements were made and written into the contract to have the Stratocruisers handed over at Portland, in the neighbouring State of Oregon. Local legislation subsequently permitted the tax to be relaxed, and in lieu of the delivery to Portland the aircraft are handed over with 4,000 gallons of fuel in the tanks.

From the beginning there was good co-operation between the operators and manufacturers, and a fair measure of standardization of interior equipment was agreed upon. This saved time, trouble and money for all concerned. In this connection the cockpit layout may be mentioned. B.O.A.C. fully approved the design and "went along" with Pan American on this vitally important unit. The British and Swedish radio installations were another example of companies agreeing to standardize—a singularly happy decision from our point of view, as it subsequently proved.

When the almost-completed Swedish aircraft were taken over, the first task was to arrange as great a measure of standardization as possible within the enlarged B.O.A.C. fleet without extra cost. In commercialese, the aim was "to avoid change orders at customer's expense." Interior layouts had to remain as they were, for the change-over to mid-position B.O.A.C.-style galleys would have been very costly in the Swedish-ordered machines already fitted with tail-positioned galleys having more elaborate and expensive Weber ovens, refrigerators, and so forth.

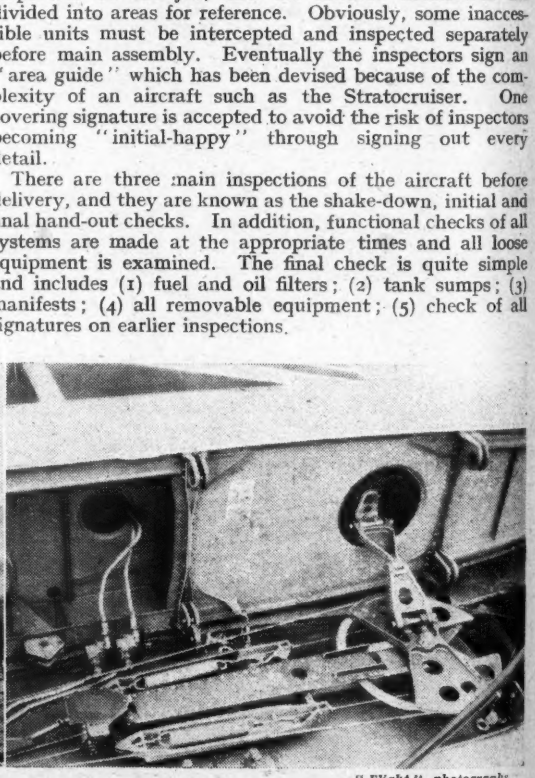
Two more schemes devised to avoid unnecessary expense were, first, the taking over of undelivered Swedish-purchased spares outside American territory—in Bermuda, to be exact—to save tax and, secondly, the baling-up of all surplus and scraps of furnishing material for re-export in order that the dollar import duty might be reclaimed. The Swedish machines are upholstered with special hand-woven fabrics, sent from Sweden to America for the purpose. B.O.A.C.'s standard interiors are also upholstered with material supplied by the operator because the use of British materials saves dollars and will facilitate repairs and replacement later on.

Important units which had to be changed on the four additional machines were the airscrews, otherwise B.O.A.C. would have found itself with Curtiss Electric as well as Hamilton types. It seems that an airscrew is technically "new" until it has been turned. Therefore, while the change to Hamilton was being arranged, large "do not turn" notices were attached when the Curtiss airscrews were fitted. Later, as a result, it was possible to dispose of them without loss. Had they been turned at any time they would have been regarded as second-hand.

### Customer's Inspection

At the Boeing plant in Seattle each customer has an office and small resident staff of technical and business representatives. B.O.A.C. started work on their Stratocruisers with a general inspection of parts as soon as these began moving through the shops, and since then checks and inspections have continued all along the line, detail inspections commencing when serial numbers were applied to the parts. At the present time there are seven B.O.A.C. inspectors on the job, and the aircraft themselves are divided into areas for reference. Obviously, some inaccessible units must be intercepted and inspected separately before main assembly. Eventually the inspectors sign an "area guide" which has been devised because of the complexity of an aircraft such as the Stratocruiser. One covering signature is accepted to avoid the risk of inspectors becoming "initial-happy" through signing out every detail.

There are three main inspections of the aircraft before delivery, and they are known as the shake-down, initial and final hand-out checks. In addition, functional checks of all systems are made at the appropriate times and all loose equipment is examined. The final check is quite simple and includes (1) fuel and oil filters; (2) tank sumps; (3) manifests; (4) all removable equipment; (5) check of all signatures on earlier inspections.



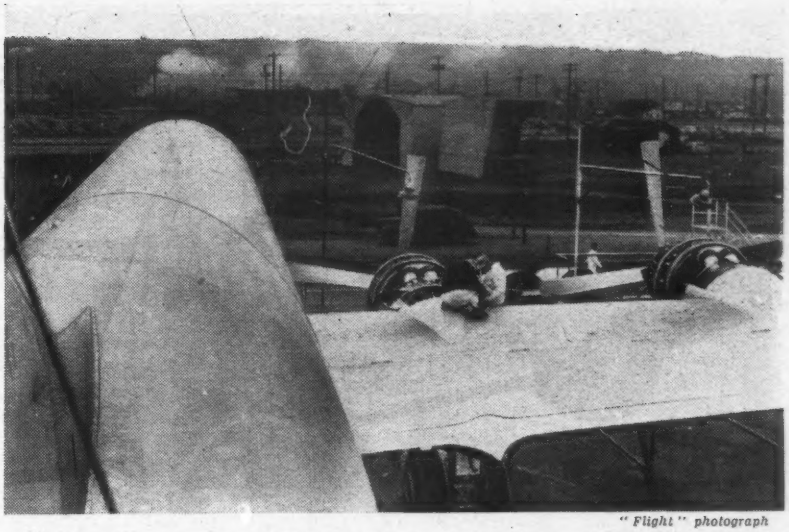
"Flight" photographs.

As on the B-50, the fin and rudder of the Stratocruiser can be folded flat along the starboard tailplane. This reduces overall height by 11ft 8in and permits the aircraft to be stored in many existing hangars. (Right) The joint of the folded tailplane, showing the ingenious manner in which the rudder is folded at right-angles without interfering with control-operating mechanism. The fin swings on bolts specially provided for the purpose, all the main attachment bolts being removed in preparation. A screwjack is employed.

# COLLECTING A STRATOCRUISER . . .

The act of handing over a Stratocruiser at the Boeing airfield entails towing it over a line. Among other things, this simple act clarifies the insurance position, and if take-off on the delivery flight is delayed B.O.A.C. are then responsible for, and must guard, their aircraft. It is important that everything should be "just so" before taking over because, in theory at least, further aid from Boeing engineers would entail their working off the company's premises.

The cost of B.O.A.C. Stratocruisers and spares will be approximately £12 million, and this sum was authorized and allocated in dollars in an American bank some time ago. Thus devaluation had no effect on the cost to this country. In addition to the ten aircraft which are to comprise the fleet, forty spare engines (bare) and sixteen spare power plants are involved.



"Flight" photograph

Engineers fitting a full set of 224 new sparking plugs to the four 28-cylinder Pratt and Whitney Wasp Majors immediately prior to delivery. This photograph was taken from the tailplane with fin and rudder in the folded position.

Any failure reflecting faulty material, workmanship or design by Boeing is covered by a guarantee for a period of six months or 1,000 hours' flying. Spares are guaranteed so long as six Stratocruisers are flying regularly to and from the United States, and drawings are provided to permit the manufacture of spares should they cease to be available from the manufacturer.

Each aircraft is paid for as it is handed over. Thus, on the morning *Caledonia* was due for delivery there was great activity and buzzing of transcontinental wires between Seattle in the far North-West of the United States, where the aircraft was standing, and New York on the East coast, where are located the two banks concerned. Everything had to be settled during the morning, because the cheque had to be handed over during banking hours in New York, where the time is three hours in advance of Seattle.

Payment for the ex-Swedish aircraft is rather more round-about, although their cost to us is said to be approximately the same. Devaluation appears to have made no difference in this case, either, for the sterling deal was concluded before devaluation occurred. Sterling in London is released to the Swedish Bank, which signals Sweden to that effect. Sweden then makes dollars available in New York.

It has been the practice so far to prepare everything in advance to permit the aircraft to take off on the long flight home as soon as it has been handed over. Of the training of air and ground crews to fly and service the new Stratocruisers details will be included later.

Registration letters are allocated to the new aircraft at an early stage, and all in the B.O.A.C. fleet have been named. The list is as follows:—

| Boeing No. | Registration | Name |
|---|---|---|
| 28 | G-ALSA | *Cathay* |
| 37 | G-ALSB | *Champion* |
| 42 | G-AKGH | *Caledonia* |
| 45 | G-ALSC | *Centaurus* |
| 49 | G-ALSD | *Cassiopeia* |
| 56 | G-AKGI | *Caribou* |
| 62 | G-AKGJ | *Cambria* |
| 63 | G-AKGK | *Canopus* |
| 65 | G-AKGL | *Cabot* |
| 66 | G-AKGM | *Castor* |

Incidentally, other companies who have ordered Stratocruiser fleets are Pan American World Airways, Northwest Airlines, United Air Lines and American Overseas Airlines.

The last inspection prior to the delivery flight is made by Boeing, and B.O.A.C. would normally make their first D.I. at Idlewild, New York.

A United States certificate of airworthiness is first issued by the Civil Aeronautics Administration, and this covers the test flights, which usually number about six, including what is called the "functional shake-down." This certificate is then validated by signal from the A.R.B. representative (Mr. F. W. Austin) in Montreal, for the first leg of the flight from Seattle to Idlewild, New York. Here the British C. of A. is collected.

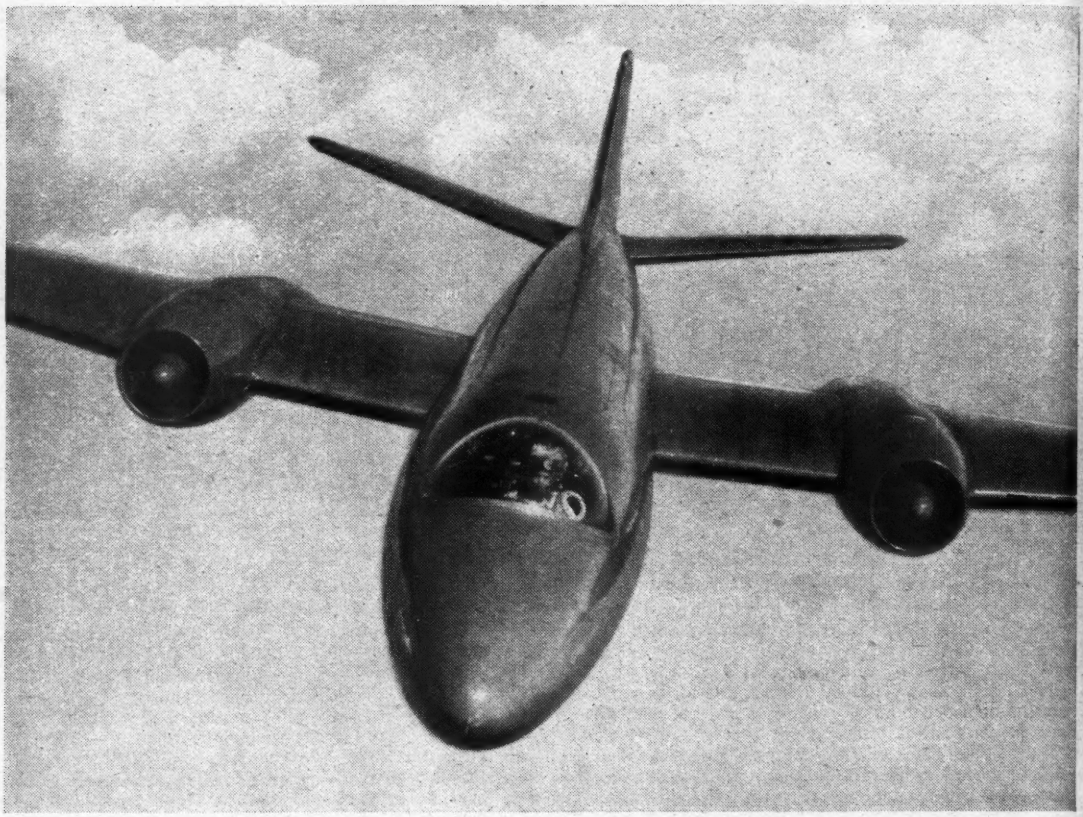
Before an aircraft leaves Seattle all paper work connected with it is created and loaded on board. Each quota of documents, it was stated, weighs no less than 3,000 lb. It includes a complete set of drawings and copies of all test reports leading up to certification.

## Delivery Plans

Concurrently with the final preparation of the aircraft, details of the delivery plan are worked out and a fully trained crew arrives at Seattle to take over for the flight home. Most of the negotiations and preparations previously discussed are under the supervision of Mr. Ed Townsend, the technical development director in the North American Area, and of Mr. Ivor Lusty, B.O.A.C.'s B 377 project engineer and resident representative at Seattle. When crews and flying are involved, the flight captain for the B-377, Captain J. W. Burgess, takes over. Before the flight the full plan is sent to those on a distribution list of about twenty, including the station managers of the airports concerned. Availability of fuel at main and alternative airfields is checked, for even half of the 46,740 pounds (7,790 gallons) of 108/135-octane petrol required to fill the Stratocruiser's tanks is a substantial order. Oil supplies present no problems, and it seems that A.D.I. (anti-detonant injection) fluid—varying proportions of water and methyl alcohol are acceptable—is available ready-mixed from Shell Aviation at all scheduled stops. A thirty-gallon tank in each wing supplies each pair of Wasp Majors.

Weather information is supplied from the local bureau at Seattle and direct from New York for the first transcontinental leg of the delivery flight.

In the second part of this description, and before mention is made of some experiences on the flight home, the very thorough training programme through which air and ground crews must pass will be described, and reference will be made to the Dehmel synthetic trainer which now plays such an important part in the training of captain, first officer and engineer.



# GETTING to know the CANBERRA

## *English Electric's Twin-Avon Bomber Under Construction and On Test*

AN *aperitif* before some rich fare in the form of a detailed technical study of the Canberra, now in preparation, these notes and impressions are the outcome of a brief visit to Preston and Warton, facilitated by relaxed security and the guidance of A.Cdre. Strang Graham, head of the Aircraft Division of the English Electric Co., Ltd.

We were fortunate in the first place in being accorded the best possible technical introduction to the Canberra—a briefing by Mr. W. E. W. Petter, chief engineer, who recalled that the Canberra idea first began to take shape as long ago as 1944, while he was still with the Westland Aircraft Company. It seems that Sir Ralph Sorley had proposed a high-performance, jet-propelled aircraft to succeed the Whirlwind and Typhoon in the low-level fighter/bomber role. On joining English Electric, at the invitation of Sir George Nelson, Mr. Petter pondered the proposition, meantime gathering round him a small team of very capable specialists. Deep study of jet-bomber possibilities brought about a change in official views, and a design contract was finally placed with English Electric for a high-altitude aircraft to be powered with two Rolls-Royce Avon turbojets. For defence it would rely on the excellence of its performance, not only in respect of speed, but of altitude and manœuvrability also.

The technical solution, as Mr. Petter explained it, was found to lie in the right choice of wing. A light wing-loading, comparatively low aspect-ratio, smooth structure and modest thickness/chord ratio were considered to be prerequisites, and sweepback was found to be unnecessary at the Mach numbers attainable when carrying a useful military load with the thrust likely to be available from two turbojets within the operational life of the aircraft. Hence the "straightforwardness" of the Canberra's aerodynamic design.

Being thus acquainted with technical background, we scaled the Warton control tower, which shuddered in a blustering rain-bearing wind as we watched W/C. R. P. Beamont take off in the first prototype Canberra. This already historic machine is still finished in what is commonly described (though with some misgivings) as "cerulean" blue; but subsequent Canberras are being painted medium sea-grey on their top surfaces, with searchlight black beneath. Beamont pulled the 64-foot-span bomber round in tight circuits, which bespoke plenty of trouble for fighters, and even managed a roll or two under the lowering clouds, recalling the warmth of more charitable weather on those memorable Farnborough afternoons. With wheels and flaps lowered, the Canberra loitered past, seemingly at the approach speed of an Anson; but the most startling moment came when we found ourselves confronted with a wing-tip vapour trail, a few feet outside the window where we stood, and but for the protection of which it seemed we should have felt the spray on our face.

Since the first prototype Canberra flew on May 13th this year, nearly 100 hours of flight-testing have been achieved. The aircraft has shown itself to be genuinely stable over the full c.g. and altitude range, but, nevertheless, as Farnborough-goers will allow, it possesses sufficiently light and effective controls to give fighter-like handling qualities. The first prototype has already undergone its initial handling trials at the Aircraft and Armament Experimental Establishment, where, winter weather and short hours of daylight notwithstanding, it was flown by seven pilots and

logged over 30 flying hours, including some night flying, in 18 consecutive days.

In the flight shed we inspected the second Canberra—a purely experimental Nene-powered variant which made its first flight on November 9th. Production of this version is not foreseen, but it was at one time considered as an insurance policy against delays in Avon development. One also saw the auxiliary tanks which fit snugly at the wing tips and which are jettisonable by explosive bolts. Another Canberra feature, hitherto little known, is the dive-brake installation, in the form of substantial "fingers" which can be projected vertically from top and bottom wing surfaces, outboard of the nacelles.

The third (Avon-powered) prototype was due to fly on the afternoon of our visit, and the fourth we saw, well advanced, in the great Preston factory. Here, too, were others fast taking form.

On the lengthy bomb-doors are rollers which slide on curved tracks, allowing the doors to be retracted well into the fuselage to reduce drag. Designed to give positive control at high Mach numbers, the tailplane is of variable-incidence type. The ailerons have spring tabs and a hand trimmer, the elevators a spring tab and a geared tab, and the rudder a spring tab, which also functions as a trim control, allowing "feet off" handling with asymmetrical thrust.

The Avon turbojets are located just forward of the main spar and have removable cowlings, comprising a front circular cowl, secured on a hoop and attached over the leading edge, two main top and bottom removable panels, and a service panel secured by four flush toggle fasteners and quickly removable for inspection of the power plants. All auxiliaries are mounted on gear boxes inside the inner wings.

**By way of a change the men behind the Canberra are seen in front of it: left to right, F. D. Crowe (chief draughtsman), who played a big part in the structural design; D. L. Ellis (aerodynamics); H. C. Harrison (production design); A. E. Ellison (assistant chief designer, developme..t); W. E. W. Petter (chief engineer); R. P. Beamont (chief test pilot); D. B. Smith (senior administrative officer); F. W. Page (assistant chief designer, technical and projects); H. S. Howat (R.T.O.).**

# FROM THE OUTSIDE IN

AN entirely new technique of airframe assembly has been developed by the Fairey Aviation Co., Ltd., and is already in use in the production of one of the firm's latest types. The new system, which reverses the usual method of first erecting the structure and then applying the skin, gives better control of the skin contours and also permits interchangeability of components to be achieved at the outset of manufacture—even in the prototype stage.

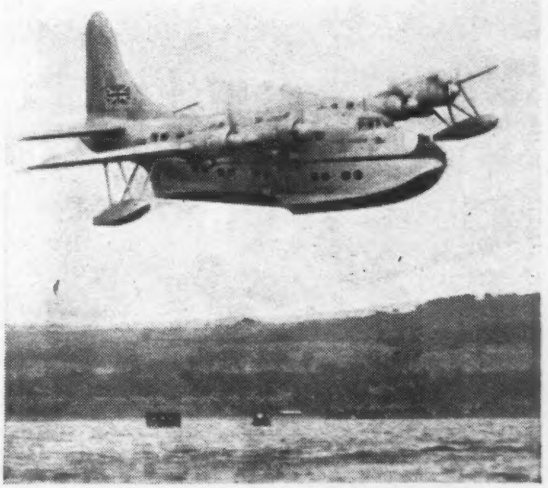
Briefly, the system (which the company has given the name of "envelope jigging" because it is based upon the outer aerodynamic form of the aircraft) consists in erecting a system of accurately shaped formers or templates for the control of the skin contours. These formers are set up on a solid fixture-base and over their contoured surfaces is fixed a metal sheet shaped to the form of the unit that is to be assembled and so dimensioned that the *inside* or concave face of the sheet corresponds to the *outside* form of the aircraft. The formers and the sheet are related accurately to a common datum.

The inside face of the sheet is sprayed with a suitable medium for marking-out, and a special table carrying a "scribing-tower" is aligned accurately with the datum. The outline of the unit to be built is then marked out on the sheet, together with frame or rib stations and the positions of rivet and other attachment holes.

When the marking-out has been checked, the holes are drilled through the sheet at the rivet-hole positions, and the sheet then becomes, in effect, a drill-template. Locations for component-attachment points are also mounted on it.

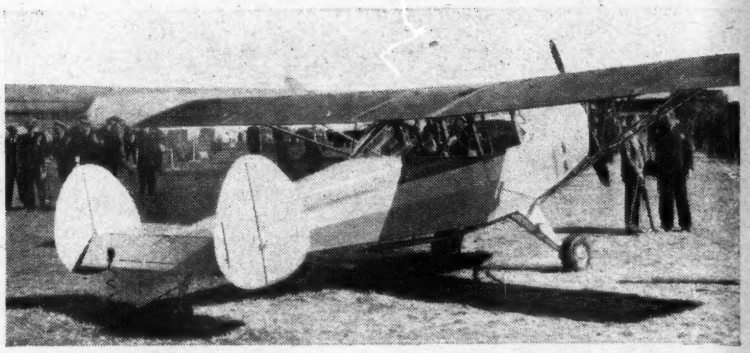
In assembling a unit in a jig of this type, the skin-panels are first located on the sheet by tooling holes, and ribs or other stabilizing members are then attached inside the skin. When the hole structure has been built up, it is drilled through the sheet template from the outside and the skin countersunk if necessary. Riveting is completed in the jig and is done from the inside of the structure, with the rivet heads "held-up" on the outside.

This method of construction has the advantage that positive control of the skin contours is given by the sheet template and that the building of the jigs can be begun as soon as the actual shape of the aircraft has been settled, very early in the design stage. By the time that detail design has been completed the jigs can be well in hand or ready—and this work can be done in the knowledge that, unless the external form of the aircraft is altered, the basic construction of the jig will not be affected. The sheet template also serves as a check on the accuracy of rib and frame profiles.



**ORDER COMPLETED: *Aotearoa II*, last of the four Short Solents for Tasman Empire Airways, Ltd., left Belfast on November 26th on the first stage of its delivery flight to New Zealand. Actually the first of the four to be launched, it has been retained for research and test work. It is the makers' claim that, although the Tasman Solents were designed before the 1952 I.C.A.O. safety and performance standards were published, they comply fully with the requirements.**

# HERE and THERE



SKYJEEP is the name selected for the latest Chrislea light aircraft, which (as mentioned below), recently made its first flight.

## Remembrance in Durham

A MEMORIAL TABLET to the members of No. 607 (County of Durham) Squadron, R.Aux.A.F., who were killed in the war will be unveiled at Durham Cathedral next Sunday by Air Marshal R. M. Foster, the A.O.C.-in-C., Reserve Command. The Service of Evensong, in which the ceremony will be incorporated, will be conducted by the Dean, the Very Rev. Cyril Allington, and the Bishop of Durham, the Rt. Rev. A. Williams, will pronounce the blessing.

## Chrislea Skyjeep Airborne

ONE of the most appealing light aircraft exhibited at Farnborough this year was the adaptable Chrislea Super Ace Series Four. The name Skyjeep has now been given to the machine, which made its first flight on Tuesday of last week. Donald Lowry, Chrislea test pilot and sales manager, flew the Skyjeep, which was airborne for nearly two hours and performed well. C. of A. tests are expected to be completed within a month.

Unlike the earlier Super Ace, the new Chrislea has a tailwheel undercarriage and detachable top to the rear fuselage, permitting use as an ambulance or light freighter; the cabin has room for four adults and two children. Developed especially for the export market, the Skyjeep has already aroused interest in Australia, New Zealand and South America.

## U.S. Tay

THE U.S. Naval designation J-48 has been given to the Pratt and Whitney production version of the Rolls-Royce Tay centrifugal-flow turbojet, an advanced development of the Nene. Two hundred and sixty-four J-48s have been ordered by the U.S.N.

## A False Alarm

AN announcement from the Fokker Works denies a recent report that drastic economy measures by the Dutch Government had put an end to the company's aircraft development programme. (The story, which received considerable publicity, was not printed in *Flight*.) The Fokker statement says that although the aviation budget is indeed being curtailed, and that a decrease in Government subsidy might cause some ambitious plans to be shelved, the economy measures did not include the suspension of all development on new designs.

Current Fokker activities include licensed production of the Gloster Meteor and Hawker Sea Fury, and quantity construction of the Fokker S.11 Instructor. The prototype of the S.13 twin-engined crew trainer is nearing completion and is expected to begin flight-tests shortly, while good progress is also reported with construction of the S.14 jet trainer (described in last week's *Flight*).

## Australia's Latest?

ACCORDING to a U.S. report, the Commonwealth Aircraft Corporation of Australia intends to build at least two prototypes of a "radical new twin-jet fighter similar to the Lockheed XF-90."

## Service Week-end Sport

BUCKEBURG, Westphalia, was the scene of a 16-0 victory for the B.A.F.O. Rugby team on Saturday last. Their opponents represented the First Air Division of the French Air Force. B.A.F.O., captained by S/L. H. H. Wood-Glover, scored two goals, one try and one penalty goal.

On the same day the R.A.F. College, Cranwell, met the Royal Military Academy, Sandhurst, at Soccer. The game was played on the Army ground in rain and poor light, and resulted in a draw—0-0.

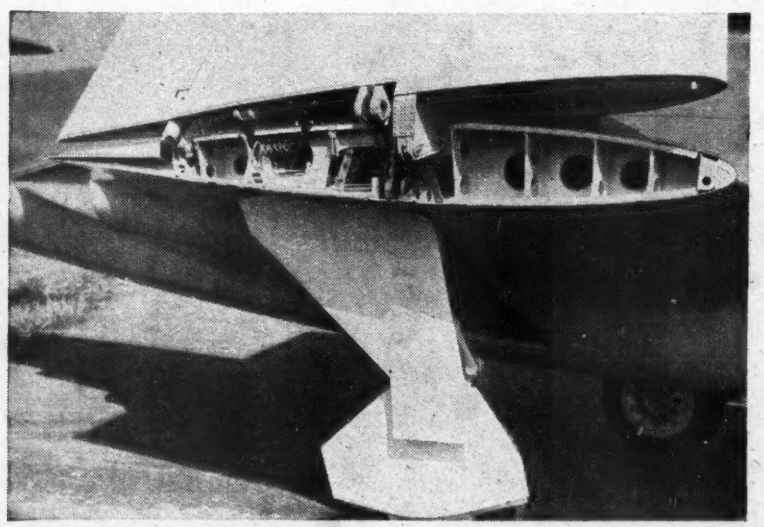
## U.S. Debuts

THE Douglas C-124 military transport (illustrated in last week's *Flight*) was airborne for the first time last Sunday. Its trip lasted 55 minutes, and was watched by 18,000 people.

Three days previously the Convair XP5Y-1 prototype flying boat for the U.S. Navy was launched in San Diego Bay, where it will undergo preliminary hull-testing before installation of its four Allison T-40 coupled turboprop units. It is expected to make its first flight early in the New Year.

## Jetliner's 500 m.p.h.

A TRUE air-speed of 500 m.p.h. in level flight at 30,000ft was recently attained by the Avro Canada C-102 Jetliner (four Rolls-Royce Derwent 5s). This second pure-jet transport has thus established a speed record for civil aircraft in North America. Flight tests of the Jetliner have been going well, and the manufacturers announce that its cruising speed will be 450 m.p.h. instead of the originally estimated 430 m.p.h. It has also been found that either of the air-



FOCUS ON FOLDING; In this close-up of the wing-joint on the Hawker Sea Hawk the neat arrangement of the pivot linkage, main folding jack and the jack-actuated latch-locking mechanism can easily be discerned. The umbilical stowage for the main undercarriage is also noteworthy. Incidentally, the folding "hydraulics," the main and nosewheel units and almost every other item of the aircraft's hydraulic system, are produced by Dowty Equipment, Ltd.

## HERE AND THERE . . .

craft's outboard turbojets may be cut at any stage during take-off with very little effect on handling, and the Jetliner has landed in less than 1,000ft of runway.

### Canadian Record?

A D.H. Vampire 2 of No. 410 (Cougar) Squadron, R.C.A.F., piloted by F/O. Malcolm Graham, recently flew to a height of 47,000ft over Montreal. The flight is thought to constitute an unofficial Canadian altitude record. F/O. Graham reported that visibility was extremely good—he could see Lake Ontario, 200 miles away—and that he remained at 47,000ft for five minutes. He used oxygen throughout the flight, which lasted fifty minutes and was made for the purpose of testing new R.C.A.F. equipment.

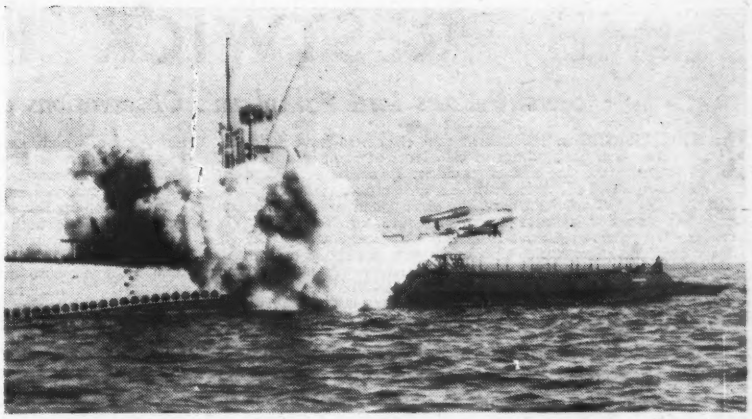
### "Lancashire" and the Lift

THE Lancashire Aircraft Corporation has produced a well-illustrated booklet reviewing the company's part in the Berlin Air Lift. In a foreword, Lord Pakenham pays tribute to the work of the *Plainfare* charter companies, to which, he says, the Corporation made a very worthy contribution.

The booklet recalls that, at the end of the Lift, 12 Halifax freighters, converted to tankers, were being operated by Lancashire Aircraft Corporation, and plans were ready for increasing the fleet to 18. Final statistics showed that the Halifaxes had made 2,849 effective flights to Berlin, carried 2,701,440 lb of coal and food and 3,676,380 gallons of diesel oil, and flown a total distance of 1,160,000 miles. The booklet concludes with an appreciation of the assistance of the R.A.F. and the staff of B.E.A. — "badgered and pursued by eager operators."

### For Naval Safety

GRUMMAN Panther carrier-borne jet fighters of the U.S. Navy now carry, as standard equipment, stall-warning equipment developed by the Safe Flight Instrument Corporation, which automatically takes into consideration variations in stalling speed caused by acceleration, decreased all-up weight, gusts and other factors.

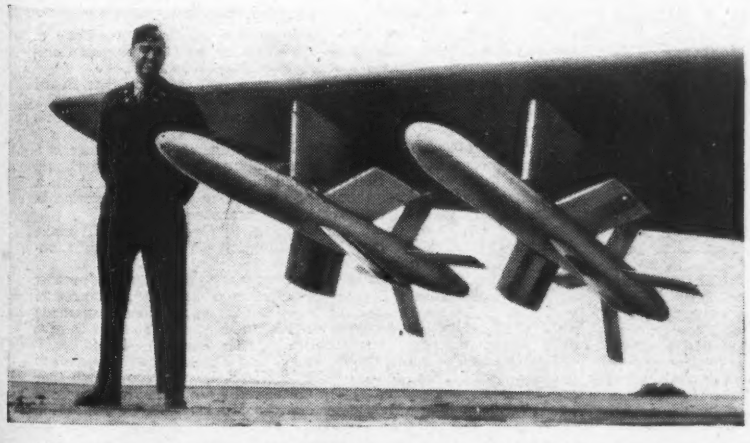


BETTER BUZZ-BOMB : The Loon—an improved, radio-controlled development of the German V.1—was openly demonstrated by the U.S. Navy for the first time off Hawaii last month. Two Loons were launched. The first fell into the sea almost immediately and the second (shown making its rocket-assisted take-off) escaped the waiting guns of 35 ships, flying 80 miles before it was sent into the ocean.

The system installed on the Panther incorporates a newly developed "stick-shaker" which is mounted coaxially around the control column and produces a low-frequency, high-amplitude shake. This is claimed to give more positive warning than the most accentuated pre-stall buffeting. The mechanism is actuated by the Safe Flight pre-stall detecting unit on the leading edge of the wing. This same unit is already standard equipment on most new U.S. civilian aircraft and several military types.

### Aviation and the Festival

FURTHER details are available of aviation's share in the South Bank Exhibition during the 1951 Festival of Britain, first referred to in these columns last week. Key feature in the air section of the 48,000 sq ft transport display will be the development of jet propulsion. Small aircraft will be shown and larger machines will be exhibited in model form. Aeronautical research and navigation aids will be depicted and there will be a large working model of London Airport.



AIRBORNE FLAK : A second U.S. development in the field of guided missiles is the Ryan Firebird rocket, two of which are slung beneath this F-82 Twin Mustang. Designed for the destruction of bombers, the Firebird is launched by a fighter and homes on to its target by radar. A proximity fuse is fitted.

## NEWS IN BRIEF

MR. STEWART SCOTT HALL has been appointed Director-General of Technical Development (Air) at the Ministry of Supply. The post of Principal Director of Technical Development (Air), which he formerly held, has been abolished.

* * *

Mr. A. E. Russell, chief engineer of the Bristol Aeroplane Company, is to sail for America on December 1st to deliver the Orville Wright Memorial lecture in Washington.

* * *

BETRO (British Export Trade Association)—a non-profit-making organization founded by Industry in 1945 and later given a grant-in-aid by the Treasury—has appointed its first director-general. Mr. Roger Falk, O.B.E., who served in the R.A.F. during the war, has been selected to fill the post.

* * *

The Scientific Film Association is preparing a national register of scientific films and is anxious to receive details (not necessarily for publication) from all who have made such films. Details should be sent to the secretary at 4, Great Russell Street, London, W.C.1 (Museum 2403).

* * *

Martin Hearn, Ltd., of Hooton Park, Cheshire, manufacturers and repairers of aircraft, sailplanes and components, announce that their name has been changed to Aero and Engineering (Merseyside), Ltd. Direction remains in the hands of Lord Grimthorpe (chairman), Maj. J. E. D. Shaw, and Messrs. F. W. Farey-Jones, G. E. Shaw, F. N. Slingsby (technical director) and J. Cuthbertson (general manager).

* * *

The Royal Aero Club has issued an amended programme of films to be shown in the near future for members and associate members, at Londonderry House. *Caribbean Ahead* and *Batavia Airport*, by K.L.M., will be screened on Thursday, December 15th, and William Courtenay's *Round the World in 90 Days* (Part 2), and *Air Travel Through the U.S.A.* will be shown, respectively, on Tuesday, January 3rd, and Tuesday, January 24th, 1950.

# THE PRESTWICK INQUIRY

## Storm Follows Lord Pakenham's Observations on the Findings

REPERCUSSIONS in Parliament and elsewhere have followed publication of the findings of the Court of Inquiry appointed to enquire into the serious accident involving K.L.M. Constellation PH-TEN near Prestwick on October 20th-21st, 1948. Piloted by Capt. K. D. Parmentier, chief pilot of K.L.M., the aircraft left Schiphol at 2111 hours en route for New York via Prestwick. Weather conditions at Prestwick necessitated a G.C.A. let-down and the pilot decided to carry out overshoot procedure, followed by a visual left-hand circuit, to land on a runway which provided more favourable wind conditions than the one on which he was making a G.C.A. approach. While carrying out this procedure, the aircraft—whose pilot had already reported that he had established visual contact with the ground—struck high-tension electric cables in dense fog 3½ miles to the east of the airport at a height of not more than 440ft above mean sea level. The aircraft was set on fire and severely damaged, subsequently crashing in flames at a point five miles north-east of the airport at approximately 2334 hr. There were no survivors among the 40 on board.

The problem before the Court was to determine why the aircraft was flying at between 400 and 450ft over ground which was largely above the 400ft contour and less than half a mile from a spot height of 450ft (marked as 45ft upon the approach charts which were later found in the wreckage of the aircraft).

After consideration of all the evidence obtainable the Court was unable to reach any definite conclusion as to the exact cause. There appeared to have been a coincidence of a number of adverse circumstances. The absence of a uniform system regulating the conditions in which intermediate (deterioration) weather reports should be sent out prevented the aircraft from receiving intimation that the amount of cloud had increased from four-tenths to six-tenths between 2250 and 2320 hours. The Court found that failure of the meteorological staff at Prestwick to enforce obedience to the order that reports of weather deterioration should be given in plain language to the air traffic control officer, and the latter's failure to pass on the information which he had received in code, resulted in the omission of the words "deterioration" and "deteriorating" from verbal messages to the aircraft during the G.C.A. approach. The unexpectedly low cloud conditions encountered, erroneous charts, and the absence of any stop-watch timing for executing the attempted circling manœuvre when visual reference to the ground was temporarily lost, caused the aircraft to be flown at a dangerously low altitude and to collide with the high-tension electric cables. The suggestion that severe turbulence, engine failure or some extraordinary occurrence may have prevented the aircraft from gaining height or distracted the crew from their duties was also considered, but no evidence was available.

In consequence of the fact that the comments made in the report were largely of a critical nature, the following recommendations were also made by the Court:—

(1) That airlines operating in or over Great Britain should submit their navigational instructions relating to airports in Britain to the Ministry of Civil Aviation for the purpose of checking the accuracy of the topographical information they contain.
(2) That the Meteorological Office, Air Ministry, should take steps to promote agreement among all airlines using British airports as to the circumstances in which special (deterioration) weather reports are issued.
(3) That flying experience in transport aircraft at night and in marginal weather conditions should form part of the training of all meteorological observers and forecasters.
(4) That stricter control should be exercised over observers' reports to the control tower to ensure that all instructions are implicitly obeyed.
(5) That mechanical recording of R/T messages between the ground and aircraft should be installed at Prestwick Airport.
(6) That the possibility be explored of using G.C.A. apparatus to observe the progress of all aircraft using the circuit.
(7) That one of the airport emergency vehicles be fitted with two-way R/T apparatus for the purpose of providing direct communication with the control tower.
(8) That K.L.M. should include in their aircraft navigational equipment a suitably scaled map showing accurately the topography of the environments at each airport.

In view of the criticism which the report levelled at members of the traffic control staff and meteorological services at Prestwick, the Minister of Civil Aviation, Lord Pakenham, decided to issue a statement on November 23rd in which he said that he would like to express his appreciation of the manner in which the Court and the assessor had discharged their complicated and difficult task. At the same time, he thought it fair to the ground-services staff to say that they had given full information and co-operation to the aircraft in accordance with normal practice in bad weather, including a satisfactory descent to visual conditions by means of the G.C.A. system. The Minister considered that the decision of the pilot to circuit Prestwick at a height lower than the obstructions in the vicinity could not have been influenced by the action or lack of action of the traffic control or meteorological staffs and that it was not the case that any individual member of that staff bore a responsibility for the accident. The Secretary of State for Air was said to have been consulted and to have concurred.

The publication of this statement by Lord Pakenham caused a considerable amount of controversy in Parliament and the national Press as to the right of the Minister of Civil Aviation to express an opinion which amounted to dissent from the findings of an impartial Court of Inquiry. It also led the President of the Court, Mr. T. P. McDonald, K.C., to publish correspondence which he had previously received from the Minister.

In a letter on November 17th to Mr. McDonald, Lord Pakenham had stated that both the Secretary of State for Air and himself were seriously worried by the implication contained in the report that members of the traffic control or meteorological staffs indirectly bore some measure of responsibility for the accident. His letter continued: "Since members of these staffs, being Civil Servants, are not in a position to defend themselves publicly in any way, we feel it our duty to publish a Press statement to the effect simultaneously with the publication of your Report. You would not, I am sure, wish me to go into the reasons which have led us to this conclusion. I can assure you that it has been reached after much careful thought, and, in the circumstances, I feel it is only right for me to make this public statement in order to protect the Civil Servants concerned."

Replying to Lord Pakenham, on November 21st, Mr. McDonald, after expressing surprise that the Minister "should have thought it necessary to refer to the unbiased way in which the enquiry had been conducted," said that he had taken no account whatsoever of any repercussions there might be upon any individuals concerned, whether these were Civil Servants or not. Mr. McDonald further stated: "The Civil Servants to whom you refer were, of course, represented at the Inquiry, and some, if not all of them, were present and gave evidence. I should have thought there was every reason why you should state the ground upon which you and the Secretary of State for Air differ from the findings of the Court. If the dissent is based upon evidence, then I am wholly unable to understand why it was not tendered at the public Inquiry. As neither you nor the Secretary of State for Air were present in the aircraft at the time of the pilot's decision, there can be no other relevant basis than fact for such an attitude which, if I may respectfully say so, renders the whole procedure of impartial enquiry nugatory, if not indeed indecently farcical. It is plain to me that the evidence of this statement is to impute without evidence sole responsibility to a dead man, a pilot of unblemished record and unrivalled experience." Mr. McDonald added that in the circumstances he reserved the right to communicate the matter to the Press.

### Questions in the House

So great was the controversy caused by these statements that they were made the subject of questions to the Parliamentary Secretary, Mr. Lindgren, in the House of Commons on Wednesday, November 23rd. In reply to the critical implications of such questions, Mr. Lindgren maintained that after a Court of Inquiry had submitted its report to the Minister he should surely be permitted to dissociate himself, in the protection of his staff, against one of the findings of the report. Another speaker asked whether it was not desirable that all inquiries into civil air accidents should be divorced from the Minister of Civil Aviation, bearing in mind the fact that his own staff might be involved and implicated. Mr. Lindgren finally undertook to convey to Lord Pakenham the suggestion that he should issue a statement setting out his reasons for dissenting from the findings of the Court.

Another indication of the general attitude in aviation circles can be obtained from the statement issued by the Guild of Air Pilots and Air Navigators of the British Empire:—

"The Guild has for many years emphasized the importance of independent investigation. In its evidence to the Newton Committee on Accident Investigation Procedure it stated:—

"'It is considered necessary to set up an Air Accident Board independent of the Ministry of Civil Aviation.'

"One of the most important statements in the Committee's report is:—

"'The rule that no man should be judge in his own case is a basic concept of justice. It is as important that justice should appear to be done as that it should be done. We do not think it right that the Minister should be required to exercise discretion in connection with accident investigation procedure.'

"It is hoped that the publicity given to this Inquiry will make obvious the necessity for the introduction of the Newton Committee's recommendations."

Further developments in the controversy took the form of a request by the Prime Minister for an explanation of the circumstances in which the Minister's statement was issued. Lord Pakenham made two visits to Downing Street, and it is understood that he is to give an explanation to-day (December 1st) in the House of Lords.

The question is undoubtedly one which all aviation interests are following with deep concern and, while it is not known whether any other reasons existed which influenced Lord Pakenham to issue his statement, it is widely felt that the Minister has by his action repudiated the efficacy of an investigating system which he himself established a year ago. The outcome appears to justify the Guild's call for the introduction of a separate Civil Air Accident Board, to which the Chief Inspector of Accidents would be responsible. This suggestion, the major recommendations of the Newton Committee referred to in the G.A.P.A.N. statement above, was, at the time, rejected by Lord Pakenham.

# TORCH in the SKY

## *Purpose and Practice of the Empire Test Pilots' School*

By C. B. BAILEY-WATSON

THE early metallurgists of ancient Rome used an earthenware crucible called a *testa* for their refining, and it is from this root that the English word "test" derives. With such a derivation it is understandable that the word should be peculiarly incisive and should indicate a thorough search for a specific objective. In relation to aviation, the term "test-flying" can therefore properly be taken to mean the search for absolute truth in the performance of an aircraft—a matter which can be broken down into a host of intrinsic sub-definitions.

Test-flying is one of those occupations which, to people who know little of it, is suffused with a glamour that in actual fact is conspicuously absent. It is often hard work physically, always hard work mentally and, although by no means so lethal as commonly thought, is sometimes dangerous. In the past, test pilots were marked chiefly by their flying skill rather than by their technological ability; but since, on the basis of the definition of test-flying just made, it is a simple extension to postulate a test pilot as a person who flies an aircraft for the purpose of determining its modes of behaviour and the precise limitations in those modes, it follows that, in addition to possessing the ability to fly well, he should also have a useful working knowledge of aerodynamics, physics, structures, engines, hydraulics and electrics. The complexity of the modern aircraft and the performance range are such that, without this knowledge, the test pilot would be unable to interpret his flight reactions in a clear, objective report of which the technical design staff could make the most effective use.

During the inter-war years, aircraft production was a fairly leisurely affair—as, indeed, was aeronautical research. War, however, imposed stringent urgency on both fields and, money being no object, the rate of development was increased to an almost fantastic extent. And with the enormous stride forward, the *laissez faire* norm of the third and fourth decades went by the board. At first the change manifested itself chiefly as an increase in the number of aircraft built, and most of the firms had staffs of test pilots who, by working frantically hard, managed to meet the demands made of them. As time progressed, however, the pressure steadily mounted, and Service pilots were seconded to firms to aid the situation. But it soon became obvious that the whole matter needed to be rationalized—it was not good enough to expect a Service pilot, capable though he might be, to do a test pilot's job by picking up the business as he went along; some central source of training for flight-test work was required. To this end, early in 1943, the Empire Test Pilots' School was established at Boscombe Down.

The opening of the School aroused a great deal of interest and the earlier courses comprised students not only from the R.A.F. and Dominions Air Forces, but also those of our American, Dutch, French, Norwegian, Belgian, Greek, Polish and Chinese allies. From the very first, the School was open to civilian entrants—a logical policy in that virtually all prototype test work was, and is, performed by civilian pilots—and it is of some interest to record that several famous civilian test pilots of wide experience were numbered among the early students. The cosmopolitan nature of the intake is a matter which warrants emphasis, for although Great Britain is generally regarded as somewhat of a slowcoach, the School is now six years' old and is still unique: no other comparable establishment exists anywhere in the world.

Nowadays, of course, the diversity of nationality among students is not up to wartime standards, but the "open house" character still applies, and although the present course is, perhaps, not fully representative of this aspect, it does give some indication of the catholicity. Somewhat naturally, Englishmen predominate (fifteen R.A.F., four R.N.), but, in addition, there are three Americans (two U.S.N., one U.S.A.F.), two Canadians, two Indians and one Australian. The fact that no students from private organizations are included in the present course is, perhaps, fortuitous.

Limitations of space at Boscombe Down made it necessary to move the School to Cranfield in October, 1945, and there it stayed, very comfortably, for nearly two years.

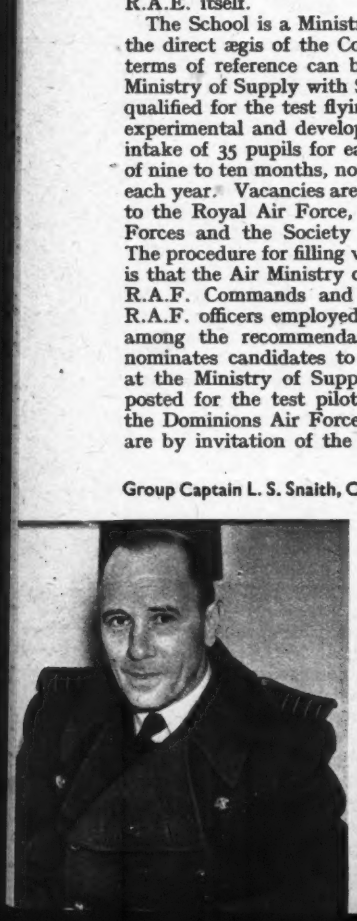
Silhouetted against an "enlightened" sky an E.T.P.S. Lincoln flies for our photographer.

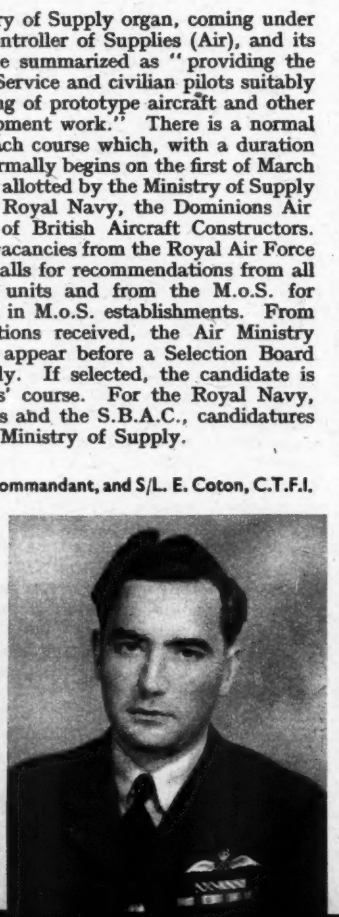
## TORCH IN THE SKY . . .

This situation was, however, somewhat remote, and the fact that each course spent a month or more at the Royal Aircraft Establishment made it altogether more desirable—especially in the light of everyday activity at the R.A.E.—that accommodation for the School should be found at Farnborough. This was done, and in August, 1947, the School moved to its present home, where it is provided not only with its own self-contained domestic, administrative and technical buildings, but where, in addition, are offered the advantages of a large airfield, first-class traffic-control facilities, servicing and maintenance personnel and, of course, the technical and scientific resources of the R.A.E. itself.

The School is a Ministry of Supply organ, coming under the direct ægis of the Controller of Supplies (Air), and its terms of reference can be summarized as "providing the Ministry of Supply with Service and civilian pilots suitably qualified for the test flying of prototype aircraft and other experimental and development work." There is a normal intake of 35 pupils for each course which, with a duration of nine to ten months, normally begins on the first of March each year. Vacancies are allotted by the Ministry of Supply to the Royal Air Force, Royal Navy, the Dominions Air Forces and the Society of British Aircraft Constructors. The procedure for filling vacancies from the Royal Air Force is that the Air Ministry calls for recommendations from all R.A.F. Commands and units and from the M.o.S. for R.A.F. officers employed in M.o.S. establishments. From among the recommendations received, the Air Ministry nominates candidates to appear before a Selection Board at the Ministry of Supply. If selected, the candidate is posted for the test pilots' course. For the Royal Navy, the Dominions Air Forces and the S.B.A.C., candidatures are by invitation of the Ministry of Supply.

Group Captain L. S. Snaith, Commandant, and S/L. E. Coton, C.T.F.I.





One of the things which has been established beyond doubt in the courses is the necessity for candidates to have a good basic standard of education for, no matter how excellent a man may be as a pilot, he will be essentially unsuitable for flight test work unless he is capable of giving a reasoned, objective appraisal for the technicians. Thus the qualifying conditions for a place in the School are as follows: candidates should (i) be under the age of 30 at the date the course begins; (ii) have matriculated or obtained an equivalent school-leaving certificate in English and mathematics; (iii) be experienced in the flying of at least ten different types of aircraft (elementary and training types may be counted); (iv) have flown 750 hours as first pilot, although a lower figure will not be a bar to acceptance when a candidate is considered specially suitable; (v) be assessed as possessing "exceptional" or "above average" ability as a pilot; and (vi) be in regular flying practice. Candidates from the Royal Air Force must hold a permanent commission or have at least three years to serve from the date of the start of the course. Medical category must not be lower than A.1G.1.

The start of a course is always arranged for a Tuesday morning, but to accelerate the bedding-down process and to overcome the inevitable hiatus occasioned by personal reserve, an excellent system of "integration" has been adopted. Students are ordered to report at the School on Monday, and that evening an At Home is held. By this means, all the new students make the acquaintance of the School staff and each other in convivial circumstances, and aside from the advantage of permitting the course to begin the following morning without delay, the psychological benefit of getting off to a cheery start has been established beyond argument.

The Commandant of the School is G/C. L. S. Snaith, A.F.C., who, it may be remembered, was a member of the 1931 Schneider Trophy team. In his younger days, G/C. Snaith was a notable athlete, having represented the R.A.F. in athletics, created a new R.A.F. half-mile record (in 1927) and played for the Service rugby football team in 1922-23-24. Test flying has occupied part of his Service career in that, from 1931 till 1934, he was a test pilot at the Marine Aircraft Experimental Establishment, Felixstowe, and from May, 1941, until March, 1942, he was test-flying American aircraft for the British Air Commission in the U.S.A. The previous Commandants of the E.T.P.S. have been G/C. J. F. X. McKenna (in whose memory the McKenna Trophy is presented to the best all-round student on each course), G/C. H. J. Wilson, C.B.E., A.F.C., A.R.Ae.S. (who in 1945 established the world's speed record of 606 m.p.h. in a Meteor), and G/C. S. R. Ubee, A.F.C., from whom G/C. Snaith took over the School in December, 1948.

The three officers responsible for the flying side of School activity are respectively the chief test-flying instructor,

When L. W. MacLaren took this photograph the Vampire was just coming-in to join the formation.

S/L. E. Coton, D.F.C. and bar, A.F.C., A.F.R.Ae.S., Lt. Cdr (E) P. S. Wilson, R.N., D.I.C., A.M.I.Mech.E., A.F.R.Ae.S., and S/L. C. B. Brown, A.F.C., all three instructors themselves being ex-students of the School. Before being posted to his present appointment, S/L. Coton was chief test pilot at the R.A.E., during which time he was responsible for flight research work at high Mach numbers and investigations on the Messerschmitt 163, on the stalling and rudder-buffeting conditions of the Tudor I, and the elevator over-balance in icing conditions on Vikings. It was for his work at Farnborough that he was awarded the A.F.C.

Lt. Cdr. Wilson was posted to "C" Squadron (Naval types) A. and A.E.E., Boscombe, in August, 1945, and after attending the E.T.P.S. course, had a period in the Service Trials Unit the following year. He then once more returned to Boscombe, at first again to "C" Squadron, and subsequently as C.O. of the Intensive Flying Development Flight, from which appointment he was posted to the School. S/L. Brown has the classical nickname of "Cyclops"—he lost his right eye in combat with an enemy aircraft whilst serving in 616 Squadron in 1942. Despite this loss, he continued operational flying with 532 Night-fighter Squadron until posted to Boscombe as test pilot in 1943. In 1947, having taken the E.T.P.S. course, S/L. Brown went to the Empire Flying School and there graduated top of that course. He then came back to the School for his present appointment and, with approximately 1,000 hours of test-flying on about 100 types of aircraft (despite monocular vision) is a qualified instrument-rating examiner and instructor. He states that one of his current activities is having a battle with the authorities to prevent being transferred to the Secretarial Branch—a battle seemingly of right against might, in which we wholeheartedly wish "Cyclops" every success.

Although flying accounts for a large section of the School curriculum, schoolroom work is of equal importance and, in fact, there is a lecture for all students every morning from 0845 until 0945. These lectures are given by a member of the resident staff or a visiting specialist from, perhaps, one of the departments of the R.A.E., from Boscombe Down, Beaulieu, Felixstowe, an R.A.F. command, or from an aircraft or engine manufacturer. In addition to the planned lectures, students are, from time to time, given talks by such eminent people as Sir Frank Whittle, Professor G. T. R. Hill and Mr. W. G. A. Perring, Director of R.A.E.

At the beginning of each course, the students are divided into four groups or syndicates and, after the morning lecture, the courses are detailed and briefed for the remaining programme of the day. Students in groups A and B, for example, may fly for the remainder of the morning, whilst group C do some gliding and group D do private study, write reports, or attend coaching/tutorial instruction from the resident staff. In the afternoon, the programme is reversed, so that all students fly each day, weather permitting and so forth. The School day normally finishes about 1700 hr although, during the summer, advantage can be taken of the late sunset to gain extra flying time. Night flying is also included in the curriculum, and is so arranged that each student does four or five night flights during his stay at the School. In this connection, any student who does not possess a green ticket when he enters the School obtains one before completing the course. The target figure of 100 hours of test-flying, or practice test-flying, per student is set for each course, but the average figure for the current intake is about 120 hours.

There is no doubt at all that the E.T.P.S. course is strenuous in that, for every hour spent flying, somewhere between two and three hours' report-writing and analysis is required. As already mentioned, one of the chief aims of the course is to train and produce test pilots who are capable of giving a detached and reasoned account of their flight experience. The attainment of this objective devolves in no small measure on the chief technical instructor, Mr. G. W. Jones, B.Sc., and his assistant, Mr. J. A. Lawford, B.Sc., A.F.R.Ae.S. After two years each with Handley Page and Airspeed, Mr. Jones spent from 1937 to 1945 at the Air Ministry and M.A.P. on specification-writing and performance-estimating. The subsequent two years he spent at Volkenrode and Minden as a member of the Control Commission for Germany, thereafter going to Boscombe Down until taking up his present appointment this year. After graduating from Glasgow University with a first-class Honours B.Sc. in mechanical engineering, Mr. Lawford also went to Boscombe, in April, 1944, thence transferring, in June, 1946, to the Empire Test Pilots' School, which at that time was, of course, at Cranfield.

Qualified instructors—though not test flying instructors—on the E.T.P.S. staff are F/L. P. F. Wingate, D.S.C.,

S/L. Brown and Lt. Cdr. Wilson, T.F.I.s, G/C. Snaith, Commandant, and Mr. G. W. Jones, C.T.I.

Sun-dappled cumulus and a TF3 Mosquito at 4,000ft above the Hampshire countryside.

## TORCH IN THE SKY . . .

and F/L. K. E. Walters, A.F.C. Both, however, are due for posting after a long tour of duty.

A rough breakdown of the course to give approximate periods spent under each of the general headings is as follows: (i) familiarization of new types, 4 weeks; (ii) performance measurement, including take-off fuel consumption, cooling, 10 weeks; (iii) handling, including stability and control assessment, 17 weeks; (iv) general revision, 4 weeks; (v) visits to firms, 4 weeks; (vi) mid-course break, 2 weeks. The lectures given during the course can be tabulated under the following broad headings:

General revision of principles of flight and introduction to advanced mathematics.

Determination of aircraft climbing speeds and the measurement of climb performance.

The measurement of aircraft speed performance, including the problems of position and compressibility errors.

Cooling assessment of an aircraft, and power-plant development work.

Fuel consumption measurement and determination of range.

The measurement of take-off and landing performance.

The performance of turbojet aircraft.

Introduction to handling tests, with particular reference to observation, reporting of aircraft characteristics and control behaviour.

Control surfaces and factors affecting their behaviour.

Longitudinal stability, including dives and the measurement of stick force per *g*.

Lateral and directional stability and the assessment of manœuvrability.

Problems relating to flight at high Mach number.

Spinning tests.

Manœuvrability at high altitudes.

Asymmetric handling and performance, including the determination of safety speeds, etc.

Comprehensive handling trials, including the effect of modifications and external stores.

Armament test work.

Instrumentation and photography in relation to tests.

Work of the experimental establishments and the requirements of operational commands and civil airlines.

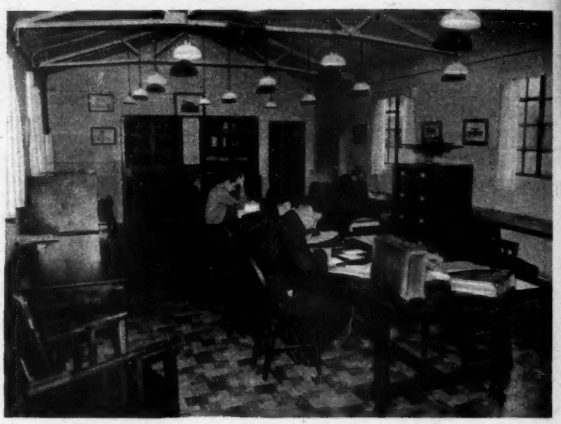
Special problems of naval, civil and rotary-wing type aircraft.

Problems and processes of aircraft design.

Current trends in research.

During the later stages of the course, each student is expected to give a talk, lasting about 40 minutes, on a subject of his own choice. This need not necessarily be directly concerned with flying, but should be capable of subsequent discussion. An interim examination consisting of one three-hour paper is held during the week preceding the mid-course break, and a final examination, consisting of four three-hour papers, is held during the last month of the course. Socially, the high-spot of the E.T.P.S. year is the annual dinner, when the McKenna Trophy is presented; it takes place this year on December 6th.

In addition to the visits to establishments and manufacturing concerns, a visit to an aircraft carrier is usually arranged. This year (at the suggestion and "organization" of one of the U.S.N. students) the course were guests for five days aboard the 45,000-ton U.S.S. *Coral Sea* in the Mediterranean—a visit which was enormously enjoyed by the visitors and, apparently, by the host, for a repeat invitation has been extended for next year. In this matter of Anglo-American relations, the School occupies a high place; so much so, in fact, that it seems to be the rule rather than the exception for Americans in the flying Services visiting this country to gravitate to the School for one or two days of general talking and the interchange of ideas; things which, ultimately, constitute the lifeblood of progress.

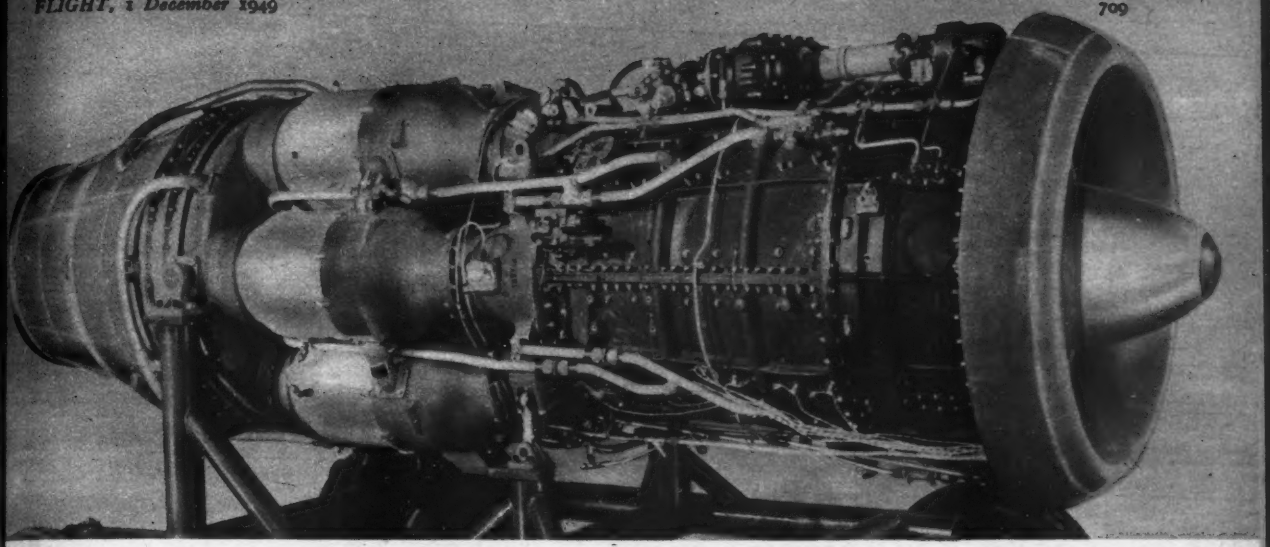


Candid-camera shot: These students busily at work in the library were unaware of our photographer.

Mention should be made, in conclusion, of the School's fleet of aircraft. At the present time, it comprises Lincolns, Mosquitoes, Meteors, an Anson, a Devon, an Oxford, a Dominie, Fireflies, Tempests, Sea Furies, Vampires, Harvards, an Auster, and a pair of Olympia sailplanes. Although the sailplanes are officially stated as being mainly for recreation, gliding is regarded by the authorities as a flying requirement forming part of the course and, therefore, as noted previously, each one of the four groups of students glide on at least one day each week.

A special sub-section of the school has been formed which receives all personnel from the Ministry of Supply, who require a green (instrument rating) ticket.

"Cyclops" Brown and "Pete" Wilson run though instructions with students in the operations room.



# AVRO ORENDA

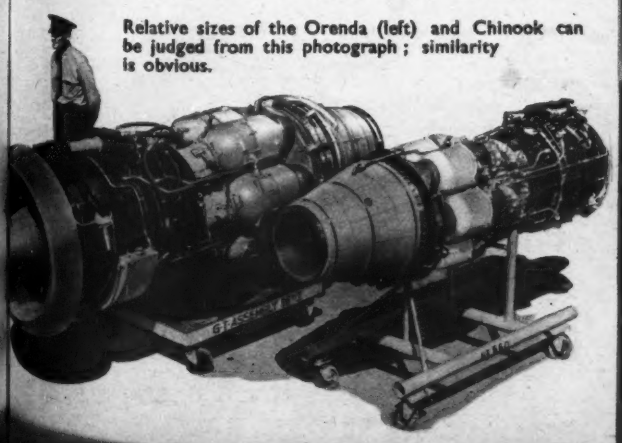
## *Canada's Second Turbojet Shows Great Promise*

THE existence of the first turbojet to be produced by A. V. Roe Canada, Ltd., was revealed in 1947, and the unit, known as the Chinook, first ran early in the following year. Intended mainly for research, the Chinook has so far proved most reliable, and there is now a possibility of further developments.

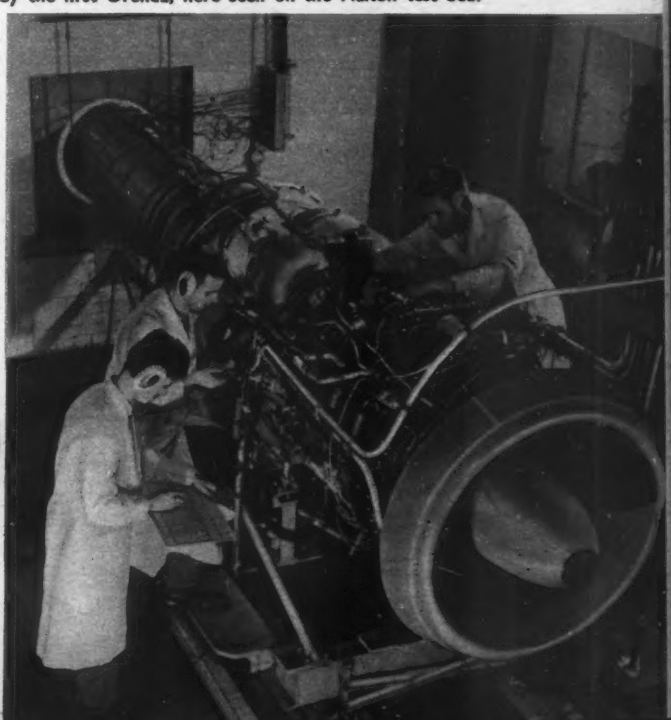
The nine-stage axial-flow compressor has a disc-type drum, the ninth-stage disc being of steel and the other eight of aluminium alloy. The blades for the first and second stages are of stainless steel, alloy being used for the remainder. Lucas equipment is used for the fuel system, and a Rotax electric starter and ignition system are employed. Maximum output is 2,600 lb thrust, and overall diameter 32in. Early steps in the development of the Chinook were described in *Flight* of January 22nd, 1948.

Based on Chinook experience (and to some extent a scaled-up version of the earlier unit), the new Orenda, about which some preliminary data has now been released, is very similar in layout. It has a direct-entry axial-flow compressor, six large combustion chambers and a conventional, single-stage turbine. The chambers, of Lucas design and construction, are believed to be the largest yet produced, and elsewhere there are several design features of unusual interest. The unit is in the 6,000-lb-thrust class, and with modifications to the mountings may be regarded as interchangeable with (though at present slightly heavier than) the Rolls-Royce Avon. It is later to be installed experimentally in a North American F-86 fighter, of which the R.C.A.F. have ordered a number. It may also be installed in the Avro Canada C-100 fighter, the prototype of which is nearly completed, and for which two Avons are specified.

Seven Orendas have now been made, and three are running in the fine new test houses which have been built at Malton, Ontario. The latest report on progress indicates that No. 1 Orenda, on its "third build," has run more than 750 hours without major overhaul on the current endurance run—this within 8¾ months of it turning for the first time. The test schedule for the run completed to date includes: (1) 150-hour United States endurance test; (2) 25-hour British Ministry special category test; (3) 150-hour R.C.A.F. type test; (4) 50-hour preliminary Canadian flight-rating test; (5) 150-hour British Ministry Service type-test; (6) 50-hour preliminary flight-rating test; (7) 175 hours' miscellaneous running, including simulated engine flight conditions, consumption trials and acceleration trials. All these tests were carried out at the design rating of the unit, and the only important replacements were those of the flame tubes at the end of 300 and 600 hours' running and of six nozzle guide vanes accidentally damaged.



**Relative sizes of the Orenda (left) and Chinook can be judged from this photograph; similarity is obvious.**



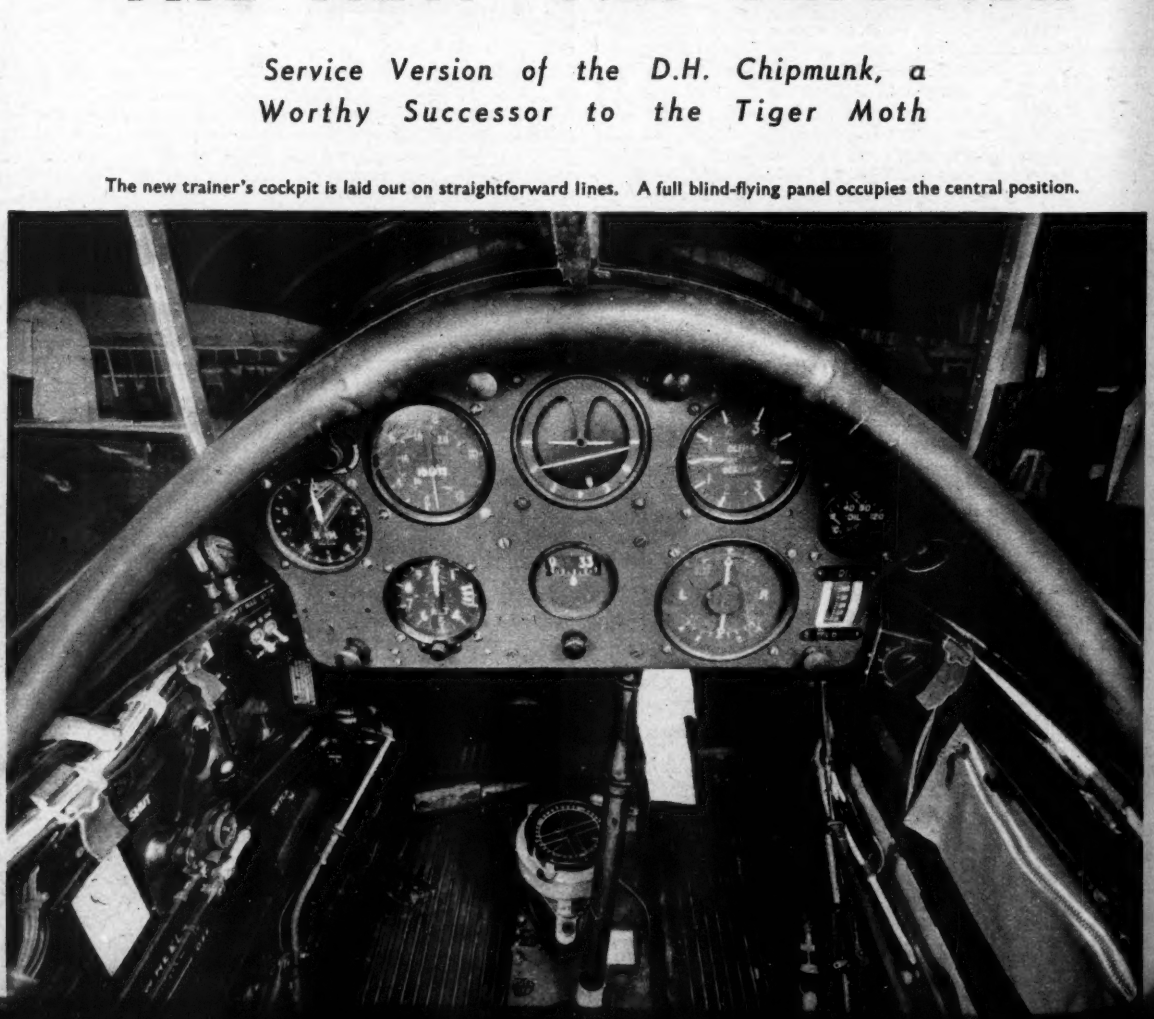
**A remarkable endurance run at designed thrust has been made by the first Orenda, here seen on the Malton test bed.**

Appropriately, the Chipmunk's birthplace was Canada, wartime training-ground for 130,000 Commonwealth airmen.

# THE NEW V.R. TRAINER

## *Service Version of the D.H. Chipmunk, a Worthy Successor to the Tiger Moth*

The new trainer's cockpit is laid out on straightforward lines. A full blind-flying panel occupies the central position.



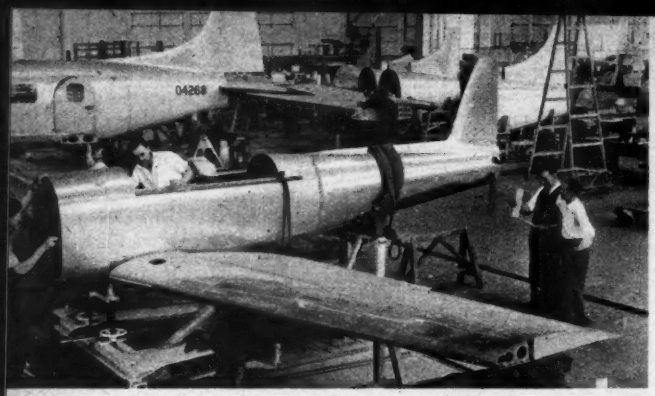
Ready for delivery : the R.A.F.V.R. colours of this production Chipmunk 10 enhance an already attractive appearance.

HOWEVER long-awaited—and usually the event is considered overdue—the introduction of almost any new type of Service aircraft is an occasion of deep and protracted interest. No exception to this rule is the D.H. Chipmunk trainer, the first examples of which are now being delivered. Although Regular R.A.F. establishments are not scheduled to receive this type, large numbers of Chipmunks are, nevertheless, destined for a long and useful Service life. A Ministry of Supply contract, signed earlier this year, established the Chipmunk as the standard aircraft for pilot training in the R.A.F. Volunteer Reserve. At present, therefore, only Reserve Flying Schools and University Air Squadrons are on the "waiting list." As a direct successor to the gallant Tiger Moth, which has been in service for 15 years (9,000 were built), the Chipmunk must live up to a high reputation. On this score, however, there should be no worries; its pedigree is unimpeachable and its progress from the beginning has been singularly trouble-free.

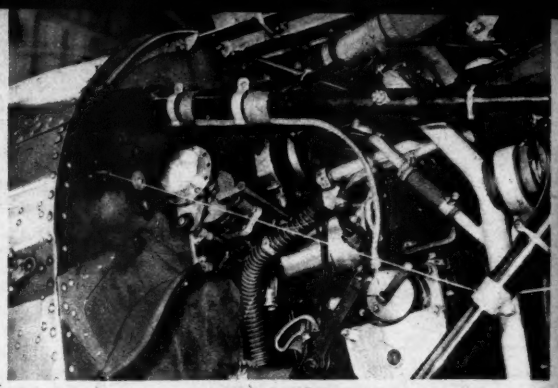
The Chipmunk is powered by the same basic type of engine as the Tiger Moth, and the two aircraft are of similar all-up weight. Considerable interest lies, therefore, in a direct comparison. Many advantages of the newer trainer are not immediately apparent. The increase in engine power is fractional, but aerodynamic cleanness has a marked effect on speeds; at sea level, the Chipmunk is capable of 143 m.p.h. (maximum) and cruises at 124, while corresponding "placard" figures for the Tiger Moth

"Flight" photograph.

One of the 9,000 Tiger Moths built (this one is "owned" by No. 17 R.F.S.) offers a direct comparison with its sleek successor.



One of the first British Chipmunks in production at Hatfield.



Close-up of the power-plant, showing the cartridge-starter.

## THE NEW V.R. TRAINER . . .

are 109 m.p.h. and 89 m.p.h. While the latter takes nine minutes to climb to 5,000ft, the Chipmunk reaches that height in 7¼ min (the Chipmunk's climb has suffered slightly from the weight added to the original specification by items of Service equipment). These increases in performance, together with shorter take-off distance, quicker climb and steeper landing approach conferred by flaps, are mainly useful in that they give a corresponding increase in the utilization of the new trainer. It has been estimated, for example, that successive circuits and bumps in the Chipmunk can be completed at the rate of one every two and a half minutes—compared with four minutes in the Tiger Moth.

In different ways, many other Chipmunk features contribute towards greater utilization. High winds and gusty weather will have a much less severe effect on taxying and ground-handling of the low-wing trainer. The incorporation of a six-cartridge Plessey starter renders the occupants of the cockpit independent of ground-crew assistance for engine starting.

Beam equipment is not fitted, and therefore the Chipmunk is not intended to take pupils up to the full basic standard of instrument flying, but its full blind-flying panel and night-flying equipment, in conjunction with the V.H.F. transmitter-receiver, facilitate a fair measure of bad-weather and nocturnal work. For instance, the Chipmunk would be able to fly in controlled zones under QBI conditions and give practice in homing, G.C.A. and QGH procedures. Finally, the aircraft is of sturdy, all-metal construction, and maintenance requirements have been effectively met.

Quite apart from enhancing its appearance, the sliding transparent cockpit canopy of the Chipmunk (which, incidentally, neatly incorporates the crash-pylon) will confer greater comfort, and, consequently, make the instructor's work easier. Engine noise and a chilly slipstream obviously detract from the pupil's concentration. It seems that the day of the open-cockpit trainer is finally over.

The Chipmunk was not conceived solely as an Air Force trainer, and the variant under discussion—the T.Mk.10—is regarded only as an adaptation of the basic design, built to the requirements of one customer. The 130 h.p. Gipsy Major 1C engine of the original Canadian-designed DHC-1 has, in the Mk.10, been replaced by the 145 h.p. Gipsy Major 10. The variable-pitch airscrew available for the latter power plant is not, however, fitted. Other innovations characterizing this sub-type include the TR 1920 four-channel V.H.F. set, which is mounted on a tray below and forward of the front instrument panel, and the two 12-volt, 15 amp/hr accumulators in series which are stowed aft of the rear cockpit. As previously observed, a Plessey self starter is mounted on the engine; it contains six cartridges and is toggle-operated from the front (the pupil's) cockpit. The instructor's canopy is bulged at each side to give forward view, and another noticeable external alteration is the raking-forward of the undercarriage, in compensation for the gain in weight.

Cockpit layout is simple and attractive. In the centre of the panel are the six blind-flying instruments: A.S.I., artificial horizon, climb-and-descent indicator, altimeter, directional gyro and turn-and-bank indicator. Rev-counter, oil-temperature and pressure gauges complete the instrument section, except for the compass. This is found on a raised mounting just forward of the stick-type control column, to the left of which is the fuel cock. On the left-hand side of the cockpit are the elevator trim-wheel and the control lever for the hydraulically operated wheel-brakes, which can be set to give differential braking by means of the rudder bar. Above it are the throttle and mixture-control levers. Flaps are operated by a lever on the right-hand side of the cockpit. Fuel contents gauges, easily read from either cockpit, are flush-mounted in the top skin of the wings.

As far as flying is concerned, the aircraft is already noted for handling characteristics that are lively but completely without vice. Controls are extremely well co-ordinated and the aerobatic performance, as demonstrated by Mr. Pat Fillingham at the last Farnborough Show, is excellent. (An "In the Air" discussion on the prototype Chipmunk's qualities was published in *Flight* of August 27th, 1947, together with an examination of structural details, illustrated by a cut-away drawing.)

It may be appropriate to recall here the major features of Chipmunk construction. The fuselage is an all-metal, semi-monocoque structure made in two sections, which are bolted together. Connected to the front section are two welded steel-tube engine bearers which support the Gipsy Major 10. Quickly removable panels give unobstructed access to this small power-plant, which is secured simply by four bolts. The low-position mainplanes are separate cantilever units bolted to the fuselage through three fittings. In the leading-edge inner section of each, accessible for filling at waist-height, is contained a 9-gallon fuel tank. There are treaded walkways at the inner roots of both wing panels.

Ailerons and flaps, fabric covered, are of the slotted type. The main wheels of the fixed, tailwheel-type undercarriage are carried on full cantilever legs, and impact shocks are absorbed by rubber moulded into cylinders.

The tail unit is of the familiar "D.H." configuration, and, with the gently tapered wings, contributes greatly towards the almost indefinable air of refinement and quality possessed by the Chipmunk. Its fabric-covered rudder is mass-balanced and carries a fixed trimming-tab. Elevators are of similar construction and the starboard unit has a cable-operated trim-tab.

### DATA FOR THE CHIPMUNK T.Mk.10
### (145 h.p. GIPSY MAJOR 10)

| | |
|---|---|
| **Dimensions** | |
| Span | 34ft 4in |
| Length | 25ft 5in |
| Height | 7ft |
| Track | 8ft 11in |
| Gross wing area | 172.5 sq ft |
| **Weights** | |
| Weight empty | 1,417 lb |
| Crew and parachutes | 400 lb |
| Fuel and oil | 153 lb |
| Removable military load | 30 lb |
| All-up weight | 2,000 lb |
| **Performance** | |
| Sea-level max speed | 143 m.p.h. |
| Max speed at 5,000ft | 139 m.p.h. |
| Sea-level cruising speed | 124 m.p.h. |
| Cruising speed at 5,000ft | 122 m.p.h. |
| Sea-level cruising range (still air) | 286 miles |
| Fuel consumption at sea-level cruising speed | 7.4 gal/hr |
| Cruising endurance (sea-level) with allowance for take-off and climb | 2.3 hr |
| Sea-level rate of climb | 775ft/min |
| Time to 5,000ft | 7.5 min |
| Service ceiling | 16,600ft |
| Take-off to clear 50ft (still air) | 310yd |
| Landing distance with brakes (still air) | 330yd |

# CIVIL AVIATION NEWS

**DRESS REHEARSAL : This view of the eight-seat passenger version of the Percival Prince was taken at Bovingdon, where the aircraft was on loan to Hunting Air Travel for operational utilization trials. Announcement of a C. of A. for the Percival Prince may coincide with the publication of this picture.**

## SALE OF HONG KONG AIRWAYS

IT was recently announced that Jardine, Matheson and Co., Ltd., have reached agreement with B.O.A.C. to purchase from them Hong Kong Airways, Ltd., the purchase to be effective on December 1st and to include the company's complete fleet of aircraft in Hong Kong. The airline will thus be owned entirely by local interests. The new owners will continue to act as general agents for B.O.A.C., and Hong Kong Airways regional services will be closely linked with the B.O.A.C. trunk routes. It is understood that these arrangements are in accordance with the plans which were made when the airline company was originally formed in 1947. Mr. D. F. Landale will continue to be chairman of the company, and the present acting manager, Mr. M. J. Auster, will become manager.

## 1950 EXCURSION FARES

WITH the object of encouraging air travel in "off season" periods, the I.A.T.A. Conference which recently concluded in Mexico City after a 15-day session, has decided to introduce a number of excursion-fare schemes in different parts of the world. Mr. E. O. Cocke, chairman of the Conference, said that fares for 1950 will generally conform to existing price-levels in the hard-currency areas of North and South America and on trans-Atlantic and trans-Pacific routes. In Europe and the Asiatic coast of the Pacific, dollar fares will be substantially reduced, but those in sterling and other devalued currencies will be subject to a slight increase. The adjustments in sterling fares, averaging about 10 per cent, were said to be necessary because of the fact that airlines operating in devalued-currency areas must still pay part of their operating costs, notably those of fuel, in dollars. "We have attempted to preserve the greatest possible benefit of devaluation to those countries forced to make the sacrifice," Mr. Cocke said.

The new cheap rates will include 15-day excursions from North America to Europe at one-and-one-tenth normal cost of a single journey, special rates for the South Atlantic crossing, discounts for inclusive tours within Europe and lower rates from Australia and New Zealand to Singapore and Rome. The North Atlantic excursion fare will apply to traffic originating north of the Equator from January 1st to March 15th, and the cost of tickets will depend on the European destination, although the basic New York-London charge will be $385 return—the lowest trans-Atlantic air fare yet charged. "Off season" rates between Auckland, Sydney and Rome will be available between June 1st and September 30th. Lastly, a ten per cent reduction will be given to passengers who catch aircraft before 0830 hours on routes from Dublin to London and six other British destinations. A computation of specific world rates and fares is now being completed in Mexico by tariff experts, and complete tables are expected to be available within a few days.

## "AIR COACH" SERVICES

THE recent inauguration of "air coach" services by several American companies on internal routes has caused general speculation as to the economic feasibility of arrangements whereby passengers are carried in conditions of slightly reduced individual comfort and with fewer amenities but at considerably reduced fares made possible by the greater seating capacity which results. In this connection a report published by American Airlines, after a year's study of all aspects of low-cost air travel, suggests that such schemes are economically justifiable provided they are operated with full cognizance of certain essential factors. First, the number of seats on aircraft used as "coaches" must be increased to an extent that will adequately offset the reduced fares and, secondly, the more modern types of transports with large seating capacity and low seat-mile operating costs should be used.

American Airlines are said to have notified the U.S. Civil Aeronautics Board that they expect to show a profit on the trans-continental air-coach flights which it will start on December 27th. Seventy passengers will be carried in DC-4s on the New York-Chicago-Los Angeles route for a coast-to-coast fare of $110 (£39 5s). In conformity with its ideas on using only large and modern aircraft on such a service the airline plans to employ DC-6s on this duty by April.

The present lack of suitable aircraft makes it appear unlikely that similar methods will be tried here for some time to come; when more "competitive" aircraft appear on our internal services experiments of this kind may be worth while.

## PHILIPPINE REPORT

THE annual report of Philippine Air Lines, Inc., for 1948, recently made available, reveals that a net profit of 552,921 Philippine dollars was made as compared with a loss of $2,487,217 for the previous year. (Two Philippine dollars=one U.S. dollar). Higher load factors in 1948 resulted in a 14.43 per cent increase in the passenger revenue; this revenue contributed 70 per cent of the gross income and amounted to 16,387,013 Philippine dollars. Passenger-miles flown numbered 103,233,177.

One of the most significant contributions to the P.A.L. results was the introduction during the year of DC-6s on

## CIVIL AVIATION NEWS . . .

international services. Almost immediately after they were put into service on the trans-Pacific route in June the load factor increased from 33.84 per cent to 50.79 per cent. The DC-6s were then carrying 50 passengers plus 4,850 lb of baggage, mail and freight and were operated, at that time, at a break-even load factor of 52 per cent, based on existing fares and on passenger revenue only.

As the result of a bilateral agreement between the Philippines and Britain, the European route was extended to London in 1948. In August, 1948, an agreement was concluded with Commercial Air Lines, Inc., whereby the latter sold its assets to Philippine Air Lines, consisting mainly of 11 C-47s and four C-64s with spares. At the end of the year negotiations were in progress with Douglas Aircraft to modernize the inter-island fleet by conversion to Super DC-3s, and it was hoped that this would effectively decrease the number of aircraft employed on these services, thus reducing operating costs whilst maintaining the same route and mileage structure. Traffic and operating statistics of major significance for 1948 were:—

| | |
|---|---|
| Scheduled miles flown | 6,710,083 |
| Total miles flown | 7,252,841 |
| Revenue passenger load factor (per cent) | 53.28 |
| Passenger-ton miles | 9,199,050 |
| Total revenue ton-miles | 13,108,991 |
| Number of passengers carried | 310,978 |
| Revenue hours flown | 47,787 |
| Total hours flown | 49,712 |

## NEW MARCONI EQUIPMENT

DESIGNED specifically to expedite and simplify the testing of aircraft radio installations, a new equipment tester which simulates the conditions under which radio is used in aircraft and provides a full range of testing facilities has been produced by Marconi's Wireless Telegraph Co., Ltd., and Marconi Instruments, Ltd. The type OA.216, as it is designated, incorporates a comprehensive range of test equipment in one steel cabinet measuring 4ft x 3ft x 1ft 4in and, although primarily intended for testing Marconi equipment type AD.97/108/7092 (which comprises transmitter, receiver, inter-communication system and automatic direction finder), it also provides facilities for testing installations by other manufacturers.

The test gear contained in the Type OA.216 includes a signal generator, beat-frequency oscillator, output-power meter, artificial aerials and a special D/F. test set. A row of standard backplates at the base of the tester, corresponding to racking in an aircraft, enables units to be taken out of service and plugged directly into the tester in such a manner that easy access to any part of the unit is assured. Testing can thus be carried out under the same circuit conditions as those actually prevailing in an aircraft. All interconnecting cables are contained within the tester and terminate within the backplates and two mixing boxes (comprising plug-in sockets, volume control and switching arrangement) are provided; these, however, are removable, thus permitting similar

(*Continued on p. 715*)

## *British Airways' Operating Statistics for July, 1949*

(Figures for the corresponding period in 1948 are given in parentheses)

| | B.O.A.C. All Divisions | B.O.A.C. Western Division | B.O.A.C. Eastern Division | B.S.A.A. | B.E.A. All Divisions | B.E.A. Continental Division | B.E.A. British Division |
|---|---|---|---|---|---|---|---|
| Passengers carried | 12,739 (12,412) | 4,075 (4,560) | 8,664 (7,852) | 1,521 (1,373) | 101,769 (78,271) | 37,664 (23,720) | 64,105 (54,441) |
| Cargo carried : Mail (tons) | 131.5 (141.4) | 32.4 (26.8) | 99.1 (114.6) | 16.3 (14.9) | 273.9 (236.3) | 173.3 (133.9) | 100.6 (102.4) |
| Freight (tons) | 304.2 (275.7) | 50.5 (41.5) | 253.7 (234.2) | 39.0 (43.9) | 507.0 (480.3) | 326.7 (362.2) | 180.3 (118.1) |
| Overall revenue load-factor (per cent) | 61.2 (65.8) | 62.4 (62.9) | 60.8 (66.6) | 37.5 (52.2) | 63.2 (63.4) | 60.0 (64.5) | 70.5 (61.4) |
| Average load : Passengers (No.) | 19.8 (17.5) | 33.2 (28.8) | 17.4 (15.3) | 7.9 (10.2) | 16.4 (14.4) | 15.9 (15.8) | 17.2 (12.9) |
| Total (lb) | 5,633 (4,946) | 6,831 (7,404) | 5,372 (4,523) | 3,101 (3,554) | 3,350 (3,000) | 3,435 (3,489) | 3,199 (2,394) |
| Average capacity : Seats (No.) | 28.3 (23.7) | 43.6 (42.6) | 25.5 (20.1) | 20.2 (17.8) | 23.5 (20.7) | 24.1 (23.1) | 22.4 (18.1) |
| Total (lb) | 9,210 (7,519) | 10,944 (11,765) | 8,833 (6,786) | 8,271 (6,813) | 5,298 (4,735) | 5,727 (5,409) | 4,537 (3,901) |
| Average length of haul (miles) : Passenger | 2,930 (3,011) | 2,319 (2,278) | 3,218 (3,410) | 1,646 (3,590) | 263 (246) | 425 (461) | 167 (151) |
| Mail | 4,920 (4,601) | 3,759 (3,457) | 5,299 (4,868) | 4,607 (5,284) | 459 (428) | 629 (634) | 166 (159) |
| Freight | 3,685 (3,343) | 3,060 (2,986) | 3,809 (3,407) | 4,274 (5,178) | 453 (425) | 602 (505) | 183 (180) |
| Hours flown : Revenue : Passenger services | 9,028 (11,116) | 1,129 (1,393) | 7,899 (9,723) | 1,484 (2,214) | 10,833 (9,313) | 5,870 (4,088) | 4,963 (5,225) |
| Cargo services | 1,126 (963) | 476 — | 650 (963) | 223 (157) | 519 (566) | 519 (566) | — — |
| Charter and special flights | 418 (418) | — — | 418 (418) | 838 — | 204 (73) | 43 — | 161 (73) |
| Non-revenue | 1,247 (1,854) | 174 (859) | 1,073 (995) | 446 (227) | 266 (304) | 148 (103) | 118 (146) |
| Equivalent annual utilization (revenue hours flown) per aircraft | 1,399 (1,328) | — — | — — | 1,695 (1,458) | 1,489 (1,576) | 1,618 (1,778) | 1,354 (1,434) |
| Unduplicated route miles in operation at end of period | 64,302 (63,502) | 7,700 (8,523) | 56,602 (54,979) | 19,757 (24,622) | 13,961 (13,632) | 11,126 (11,125) | 2,835 (2,507) |
| Percentage regularity | 99.2 (99.3) | 97.9 (100.0) | 99.4 (99.2) | 97.1 (95.1) | 98.7 (94.4) | 98.9 (98.3) | 98.6 (93.2) |
| Average length of stage flights (miles) | 1,053 (952) | 1,121 (1,101) | 1,039 (930) | 933 (1,088) | 200 (183) | 360 (393) | 116 (115) |

COMBINED traffic operating statistics for the British Airways Corporations for the month of July, 1949, together with the figure for the corresponding month of the previous year (given in parentheses) are shown in the above table. Passenger mileage flown by all three Corporations and by associates of B.E.A. showed an increase of 12 per cent over last year's figure and represented the carriage of 40 per cent more passengers. Of the total number of passengers carried on all services (130,000) 78,000 were carried on internal services alone, including 17,000 on services which have been flown by companies operating under associate agreements with B.E.A.

An increase of some 7,000,000 passenger miles was shown by B.E.A. as compared with the figure for 1948 and B.O.A.C. showed a comparative increase in freight ton-miles flown of 6 per cent. The associate companies flew 1,750,000 passenger miles—more than twice last year's mileage. The overall revenue load factor on internal services increased by 7.8 per cent but, considered as a total of all services, revealed a decrease from 63.5 per cent to 59.5 per cent for the corresponding month of 1949.

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units from an aircraft to be installed in their place for testing.

In view of the I.C.A.O. recommendation that V.H.F. D/F. should be installed at all airports to provide an international short-range-fixing and homing service, topical interest attaches to another item of Marconi equipment—a new type of twin-channel V.H.F. D/F. set which, known as the AD.200, meets official requirements and has the following features of importance to airport authorities and air traffic controllers:—

(1) An aerial system that can be located up to 30 miles from the airport.
(2) Arrangements to permit remote control of the base equipment and the transmission of bearings and intelligence over normal telephone lines.
(3) Completely automatic operation.
(4) Bearings presented on 8in meters at the site, at the control and on small repeaters. This employment of meter presentation, it is claimed, considerably reduces initial and maintenance costs and eliminates the use of intricate time-base circuits which are an essential part of cathode-ray presentation equipment.
(5) Incorporation of a method of repeating bearing information and intelligence received in the control tower to other points within the airfield.

The basic equipment provided facilities for the presentation of bearings and the reception of speech simultaneously on two channels within the frequency band 118-132 mc/s. Tests, it is stated, have established that the accuracy of bearings obtainable up to a distance of 100 miles is well within the limits required by existing traffic-control systems. This equipment is said to be the smallest V.H.F. D/F. set yet produced which incorporates all of the foregoing features, both the site and remote equipment being contained in cabinets measuring 4ft x 2ft x 2ft. An elevated H-aerial on a 30ft counterbalanced pole is used. V.H.F. D/F. has been recommended by I.C.A.O. for installation at all airports as an international short-range-fixing and homing service.

# BREVITIES

CANADIAN Pacific Airlines, it is said, are shortly to start a direct service to Honolulu to pick up and land passengers instead of merely using the island as a rest-point for both passengers and crews on trans-Pacific flights. By arrangement with an American airline, C.P.A.'s passengers can be flown direct to San Francisco and Los Angeles from Honolulu.

* * *

The eleven Plymouth flying-boats which have recently been replaced by Argonauts on B.O.A.C.'s Far East routes are now reported to be for sale. The 22-seater double-decker Plymouths, which have been in service since May, 1947, are to be sold at "the best figure possible," according to a B.O.A.C. spokesman.

* * *

On November 9th, Air France made their 2,000th crossing since they commenced Atlantic operations in July, 1946. They estimate that by the end of this year 2,200 crossings will have been completed and 22,000 passengers carried as compared with 17,248 in 1948. During June every aircraft carried 100 per cent of its payload in passengers, mail and freight on the New York to Paris service, with an average of 38.6 passengers per flight. Peak frequency achieved was 11 services per week in both directions.

* * *

L.A.I. are expected shortly to commence the first Italian air service between Rome and New York with three aircraft due for delivery in December. Funds for the purchase of the aircraft have been advanced by the Economic Co-operation Administration, after consideration of the need for additional air services to Rome during the Holy Year, 1950.

* * *

The Government of Finland is said to be interested in buying Canadian-built jet airliners, provided that it can obtain the necessary dollars. The President of the State-owned Finnish Airlines is at the moment in Montreal, where he is conferring with T.C.A. officials and inspecting the products of Canadair, Ltd. Finland's airline, which at present operates only ten aircraft, is also said to be considering a Russian type; as their Canadian enquiries suggest that they are interested in a four-engined machine it is possible that they have the Soviet's IL-18 in view.

* * *

International air traffic transactions handled by the London Clearing House of I.A.T.A. during the period September 1st to 18th totalled $13,518,160, clearances being calculated at pre-devaluation exchange rates effective in August. Noteworthy in this clearance was the high rate of offset—99.97 per cent—achieved by Sabena. Cumulative turnover for the period January to September 18th this year amounted to $116,748,828, compared with $83,252,937 for the first nine months of 1948.

* * *

Mr. L. A. G. Hooke, managing director of Amalgamated Wireless (Australasia), Ltd., has been appointed a director of British Commonwealth Pacific Airlines, as one of the two United Kingdom representatives on the Board. Sir Miles Thomas is the other representative, with Sir Keith Smith acting as alternative director when required. These appointments follow a recent decision to increase B.C.P.A.'s board from three to six directors with two representatives from each of the shareholding countries. Shares in the airline are held by Australia, New Zealand and Great Britain in the proportion of 50, 30 and 20 per cent respectively.

* * *

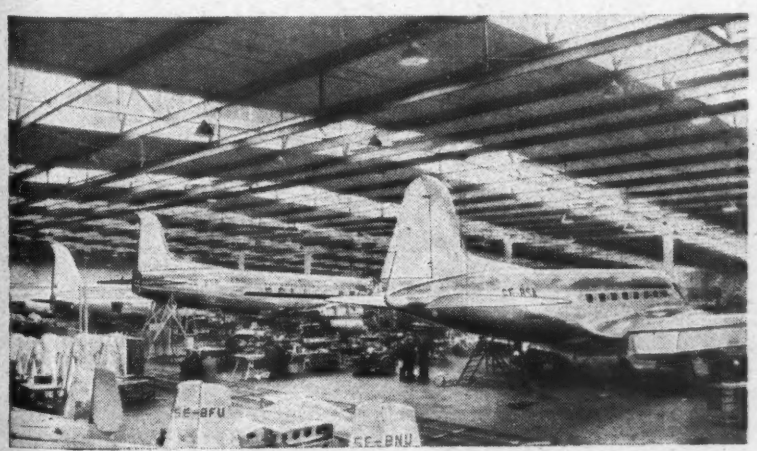
An interested crowd of spectators watched the arrival of the first foreign commercial aircraft at the new Ministro Pistarini Airport in the Argentine on November 4th. The airliner was the B.O.A.C. York *Star Gleam*, flying the scheduled service between Montevideo and Buenos Aires. The occasion was marked with due ceremony and the crew was greeted on arrival by the director-general of the airport.

* * *

Since they began operations on scheduled routes in August, 1949, Slick Airways have, they report, operated at a profit, and further large-scale expansion, involving the acquisition of ten new aircraft, is now planned. Authority has been given for the operation of services to 55 major cities in the United States; of these, 20 are now being served by regular flights and 21 on demand, while further extension of routes to the remaining 14 is likely within the next few months.

* * *

For the first time since 1946 United Air Lines reports indicate that the year's operations will show a profit. For the first nine months of this year profits totalled $2,710,574 (approximately £950,000) as compared with a loss of $238,834 (£84,000) for the same period of 1948. The report attributes this




**SWEDISH CONTRIBUTION:** The production type Saab 90A-2 Scandia, as announced on p. 719 of this issue, has now been successfully test-flown. Part of the first consignment of ten aircraft ordered by the Scandinavian Airlines System is seen on the assembly line in the above photograph.

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success to the greater experience gained by personnel, coupled with better equipment and a greater volume of traffic which together have enabled operating costs to be reduced to the lowest level in the post-war period.

* * *

Central African Airways have announced the extension of their Family Travel Plan, which was originally introduced on June 1st this year. As from November 14th, family tickets available for four-month periods enable a wife to accompany her husband at single instead of return fare irrespective of whether their children are travelling with them. The concessions apply on all C.A.A. routes except the international services between Bulawayo and Johannesburg and between Salisbury and Beira.

* * *

In *Information Circular* No. 131, the M.C.A. announces that in the interests of economy it has been decided to discontinue the practice of sending expiry-reminder notices to holders of Pilot's "B" Licences (and the three grades of professional licence now replacing it), and Aircraft Maintenance Engineer's Licences. Licence-holders are advised to make application for the renewal of their licences at least one month before these are due to expire.

A rearrangement of B.E.A. services within Germany to link Dusseldorf directly with Berlin and at the same time to permit better utilization of aircraft and crews was made on November 14th. It increases the number of B.E.A. flights in and out of Berlin from two to three daily The shuttle service between Hamburg, Dusseldorf and Frankfurt will be discontinued after December 1st in order to release aircraft for the new services.

* * *

Canadian Pacific Air Lines have inaugurated a 28-seater Dakota service from Montreal to the North-Western Quebec mining communities at Val d'Or and Rouyn-Noranda. The aircraft in use is said to be the first airliner to be fitted with cross-wind landing gear. Previously a Canso amphibian was used, but the construction of 3,500ft runways at the two airfields has made the new Dakota service possible.

* * *

Mr. G. H. C. Lee, formerly B.O.A.C.'s regional representative in Pakistan, has been appointed general manager of West African Airways Corporation in Lagos. W.A.A.C. operate a fleet of Doves and Wayfarers on services within Nigeria and the Gold Coast and provide air links with the four territories of Nigeria, Gold Coast, Sierra Leone and the Gambia. One of the inter-colonial services extends to Dakar, where it connects with the B.O.A.C. service to the U.K.

# GLIDING AWARDS

OWING to the difficulty of collecting and assessing all necessary facts, the British Gliding Association has only lately been able to confirm the award of various prizes for outstanding flights made during 1948.

It is now announced that the de Havilland Cup, awarded for the greatest height attained during the year, goes to F. Foster for the 10,800ft which he reached during a flight from Dunstable on July 13th, 1948; the Manio Cup, for the best goal flight, is won by J. W. S. Pringle, M.B.E., for his flight of 108 miles from Malvern to Cambridge Airport on March 30th; the Wakefield Trophy, for the longest distance, goes to P. A. Wills, C.B.E., for his journey of 160 miles from Staverton to Fowey on April 25th; and the Volk Cup for the best out-and-return flight, is won by C. J. Wingfield; who flew from Redhill, Surrey, to Welford, Berkshire, and back (114 miles) on May 6th. The Council of the B.G.A. recommends that, pending further investigation, no award of the Seager Cup (best two-seater performance) should be made.

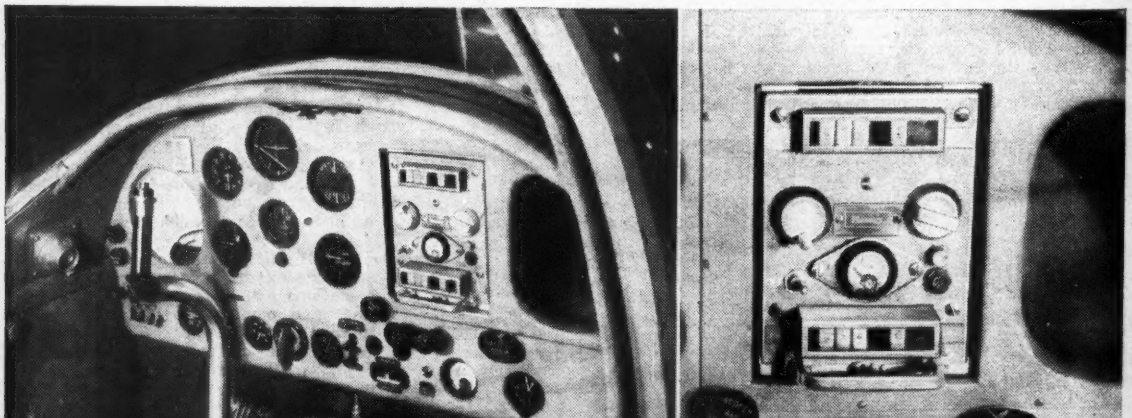
Two records were approved: Category II British National Out-and-Return, J. W. S. Pringle, M.B.E., and J. Grantham (Kranich) from Cambridge Airport to Dunstable and return, a distance of 77.2 miles (124.26 km), on August 12th, 1949; and Category I.B.G.A. United Kingdom Local Goal Flight, by D. H. G. Ince (Olympia) from Long Mynd to Yarmouth, a distance of 192.88 miles (310.41 km) on August 9th, 1949.

All pilots who have made flights which they consider may qualify them for any of the 1949 awards are asked to submit details to the B.G.A. before January 10th, 1950.

* * *

Minimum qualifications for "A" Senior Gliding Instructors, permitted to instruct dual or solo on light gliders (maximum 1,250lb a.u.w.) without restriction, were recently approved by the Council of the British Gliding Association. Each instructor is required to have 250 hours' flying as first pilot (not more than 50 hours power flying being permitted to count towards the total), and to have 50 hours' flying during which dual has been given on two-seat gliders, or ten hours of such flying if in possession of the recognized Service or civilian light-aircraft instructors' qualifications. In addition to holding a Silver Badge, the instructor must have held "B1" and "B2" instructors' categories for at least 12 months each, and must have been a winch or auto-tow driver, approved by either club or Service, for at least a year.

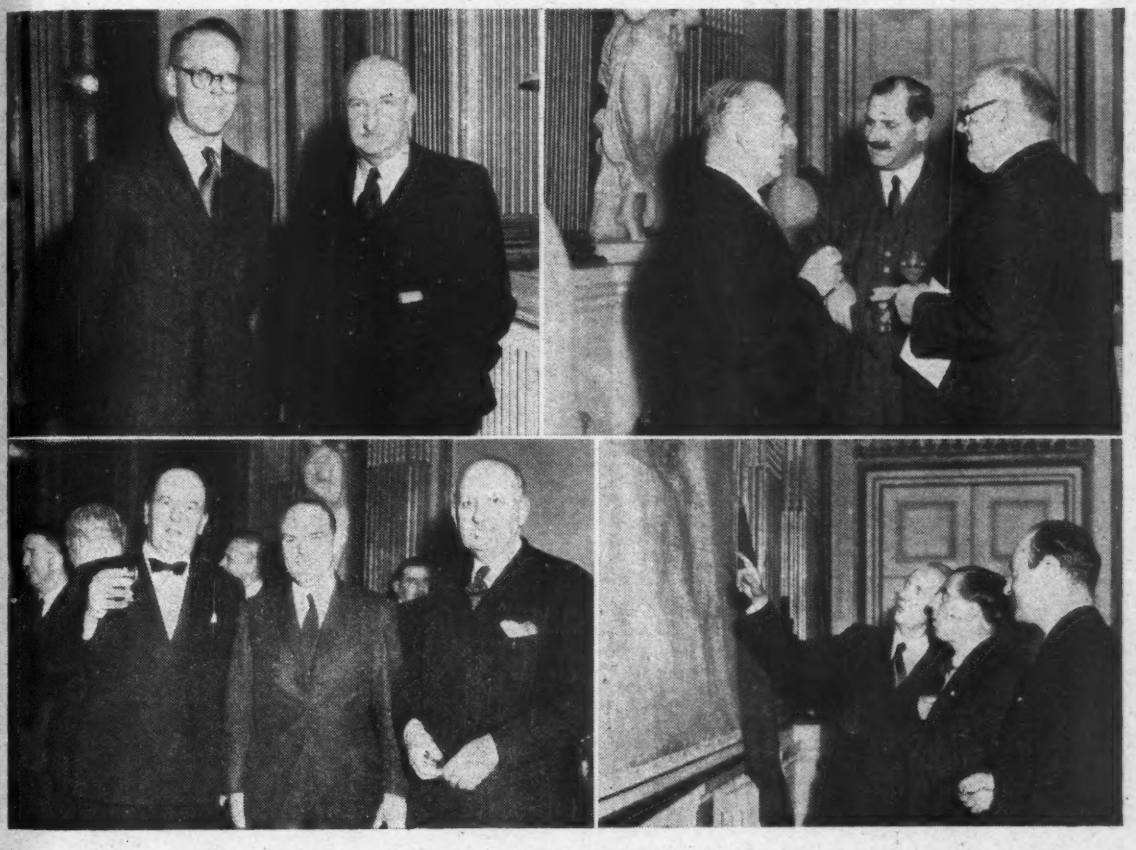
Other necessary qualifications include knowledge of B.G.A. Basic Syllabus and AP 1732, evidence of ten hours' blind flying (including instruction in recovery from spins), ability to carry out normal aerobatics on gliders, club authorization to carry out D.I.s on gliders, winches and/or tow cars, and the passing of a test by the Association's examining board. Minimum qualifications for "B2" dual instructors and "B1" solo instructors have also been established.



**LIGHTWEIGHT COMMUNICATION: A particularly neat installation of the new Plessey P.T.R.61 V.H.F. radio. The aircraft is *Flight*'s Gemini, and the work was carried out by Air Couriers, Ltd., of Croydon. In order to shorten the lead-in the whip-type aerial is mounted on the nose of the aircraft. The set weighs 17 lb, and one of its attractive characteristics is its low consumption of 55 watts. A reception range of 80 miles has been achieved at a height of 2,000ft. Remote control is available for other layouts.**

# THE ENGLAND-NEW ZEALAND RACE

## *Promoters of the Proposed 1953 Event Visit England*



**As mentioned below, two organizers of the 1953 England to New Zealand Air Race, Mr. A. B. W. George and Mr. H. D. Christie, have been visiting London, and they are seen (top left) at a party which they gave last week at the R.Ae.C. Top right, at the party, are Sir Alan Cobham, G/C. A. E. Clouston and the Rt. Hon. W. J. Jordan (High Commissioner for New Zealand). Bottom left are Lord Brabazon, Mr. S. Scott-Hall and Sir Frederick Handley Page ; Mr. W. A. Summers (Hunting Aviation) is just visible to the left. Bottom right are Maj. R. H. Mayo, Mr. G. S. Lindgren and A. Cdre. Whitney Straight.**

IF sanction can be obtained from the Ministry of Civil Aviation, both B.E.A.C. and B.O.A.C. are likely to enter aircraft for the England to New Zealand Air Race.

Following the visit to London of two of the organizers—Mr. H. D. Christie and Mr. A. B. W. George, of the Canterbury International Air Race Council, Inc.—some further details of the contest proposals are now available. It is thought that the starting date will be around October 10th, 1953, and the race will be flown from an airfield or airfields in England and finish at Christchurch, where the New Zealand Government proposes to develop Harewood Airport for the purpose. An International Exhibition is to be held at Christchurch, and it is the intention of the organizers to encourage air-transport companies to enter for the race and bring passengers to the exhibition. (It will be remembered that K.L.M. carried fare-paying passengers in their D.C.2 in the London-Melbourne Race of 1934.)

The race, which will be controlled by the R.Ae.C. as far as Singapore, is to be run in two sections, a transport handicap and a speed section, and prize money will be awarded in each as follows: first, £10,000; second, £3,000; third, £1,000; fourth, £500. In addition, cups and trophies to the value of £1,000 will go to the winners. The route will run *via* Basra, Calcutta, Singapore, and a point on the east coast of Australia. Entries will close on January 31st, 1953.

## SIR FREDERICK ENTERTAINS

SOME typically entertaining remarks by Sir Frederick Handley Page were enjoyed by a receptive audience at a "Brains Trust" held by the Luton Branch of the Royal Aeronautical Society on November 23rd. Sir Frederick was aided by fellow "brains" in the persons of G/C. Douglas Bader, Capt. "Jimmy" James (B.E.A.'s chief pilot) and A. Cdre. F. R. Banks; Mr. Peter Masefield was in the chair.

Among the questions posed during the evening was one which questioned the degree of progress made since the days when the Handley Page H.P.42 airliner carried 30 to 40 passengers on the London-Paris run in considerable comfort on a total horsepower of 2,000. Sir Frederick said that it was not for him to comment on "the lack of progress made by other people" but considered that only the complete removal of every bit of Government subsidy from civil aviation would enable us to determine whether it paid to transport people at lower or higher speeds. Mr. Masefield, in summing up this question, said that although a B.E.A. passenger could now fly from London to Paris at 210 m.p.h. and put 6s 8d into the taxpayers' pocket for every taxpayer carried, he had no doubt that, on the H.P.42s, large profits were accumulated from the bar takings.

To a more serious question, "in the opinion of the Brains Trust, which aeronautical invention during the last 30 years has made the greatest contribution to civil aviation?" Capt. James thought that G.C.A. and the Calvert lighting system had been the most beneficial inventions, while Sir Frederick Handley Page, stating that "the propaganda is not worthwhile until the patent has run out," apparently made reference to some invention of his own.

# "FOR HIRE or REWARD"

## *Test Case of Great Importance to the Private Pilot*

AT Croydon Magistrates' Court on November 25th there was decided a case which is of vital importance to all holders of Private Pilot's Licences.

The action was brought at the instance of the Crown against Mr. T. Hoggaerts (a British subject and an associate member of the Royal Aero Club) under the Air Navigation Order of April 1st, 1948 (as enabled by the Air Navigation Act, 1947). The facts of the case were simply that Mr. Hoggaerts, who was the holder of a Private Pilot's Licence, hired an aircraft and flew to Paris on April 15th of this year, taking with him two friends, one of whom paid £6 and the other £11 "as a contribution to the expenses of the journey."

The Crown prosecuted Mr. Hoggaerts under Section 18 (1) and (2) of the Order, contending that he was not the holder of the appropriate licence, which is required by the Act, because *the very fact that his passengers had paid money connected with the passage converted the machine into a "public transport aircraft" which is defined in the Order as "an aircraft carrying passengers for hire or reward."* An additional charge related to the added safety regulation required for "public transport aircraft"; but the main point at issue was to determine whether "a contribution towards expenses" did in fact constitute "carrying passengers or goods for hire or reward."

Counsel for the defence conducted the case with great ability and persuasion, contending that Mr. Hoggaerts was merely carrying acquaintances and that the sums of money paid by them to him bore no relation to the fares charged for such a journey in a strictly commercial aircraft; in fact, they were meant to be nothing more than an assistance to a young and enthusiastic pilot who would not otherwise have been able to bear the whole expenses of such a journey. No contract of hire was ever made and no reward in the usually accepted meaning of the word was ever intended.

Counsel then stressed that, as in the similar cases of cars and taxis under the Road Traffic Act, 1930, the courts had considered that the words "hire or reward" could be subject to some measure of interpretation as appropriate to the surrounding circumstances. In conclusion, he pointed out to the Court the importance of the case as a test-case, which, if it was found to be proved against Mr. Hoggaerts, would have a considerable stultifying effect upon all private pilots, who could not afford to defray out of their own pockets the full charges involved in private flying. This in its turn would react very unfavourably upon the activities of private flying clubs, with obvious undesirable consequences.

The Bench, however, decided for the Crown and declined to accept the argument that Mr. Hoggaerts had received the money merely as "a contribution towards expenses." He was accordingly convicted upon both principal charges, although the fine imposed was a nominal one.

There thus seems little doubt that almost every private pilot in this country must at some time have broken the law—by splitting expenses with friends or others when flying to meetings, rallies or other events. Even if four people agree to share only the cost of the petrol for a flight in an aircraft belonging to one of them, the fact that money is paid in connection with a passage apparently constitutes an infringement, flying for reward being involved.

In America, the Bureau of Safety Regulation of the Civil Aeronautics Board has proposed a revision of the current civil air regulation 43.60 to clarify the privileges of the private pilot. This regulation states that "a private pilot shall not pilot aircraft for hire" but an explanatory note adds that the rule permits the sharing of expenses of a flight or piloting an aircraft in furtherance of a business when the flight is made solely for the personal transportation of the pilot.

The proposed revision would establish, *inter alia*, the following points: Passengers may contribute to the operational expenses of the flight; an airline official may pilot a company aircraft incidental to his employment and carry friends or fellow employees provided no charge is made; a farmer may spray or dust his own crops, but not his neighbour's for compensation; and a private pilot may not demonstrate an aircraft for sale as an employee of, or for the benefit of, someone in the business of selling aircraft.

The proposed amendment to Section 43.60 would read "a private pilot shall not pilot an aircraft for hire or in connection with any business or employment unless the flight is merely incidental thereto and does not involve the carriage of persons or property for compensation or hire."

It is to be hoped that some amendment to the Navigation Act of 1947 will be made to clarify the position in this country, particularly so that private owners of aircraft and members of clubs may be permitted to share expenses.

If, incidentally, a paragraph similar to the last of those quoted above from the proposed American revision were adopted, it would penalize almost every British test pilot. Although quite obviously they demonstrate aircraft with the definite object of helping their employers to sell them, the majority, nevertheless, carry only a private pilot's A Licence (together with the approval of the Ministry of Supply). The anomaly, however, is an obvious one.

# ITALY WIDE AWAKE

IN reproducing this illustration of a new Fiat type it would, we think, be a pity to endeavour to improve on the picturesque description which has accompanied it from an Italian source:—

"A new plane built by the FIAT group disigned on new lines for displaying touring service, acrobating train flight school, passed its last testing flight conditions control, with fine results.

"Entirely metallic, equiped with a motor Alfa 115-1. bis, Piaggio 1030 constant revolution propeller and with the up-to-date equipement. overhanging wings, fitted with wingflaps, tandem binnacle and retractable landing gear, hydraulic drive control, electric equipment for board service and for night flight, complete radio set and radio range equipment, directional gyro instrument for blind flying, etc. In trial porformances has shown very short take off times, high rate of climb, high cruising range, safe and quick landing.

"This plane with its new lines and perfectionate equipment stands to indicate the effective rise of the Italians aircrafts constructors after the long forced drowsiness caused by last war."

"Entirely metallic"—the Fiat G. 46 so picturesquely described above.

# ODD SPOTTINGS

ACCORDING to the preface, *The Observer's Book of Aircraft** is intended as "a guide to the identification of many types of aircraft which are already well known by name." It is nicely printed on art paper and well illustrated. Unfortunately, the information given does not achieve the same high standard.

The Convair XC-99 transport is illustrated with silhouettes of the B-36 bomber. The Martin Mars flying boat is said to have distinctive "twin oval fins and rudders," but the photograph shows it flying quite cheerfully with only one of each. Mr. Lawrence has discovered many other novel recognition features; for example, the Hawker N7/46 is apparently "Generally like the D.H. 108, but has a tailplane."

The author does not explain why he includes such aircraft as the Hughes Hercules, which very few spotters are ever likely to see, or the Republic Rainbow transport, which even fewer will see, as it was never built.

There are some facts in *The Observer's Book of Aircraft* with which no one will disagree, particularly the author's remark on page 8: ". . . don't assume that everything you see and read in this book is absolutely correct."

*By Joseph Lawrence. Frederick Warne and Co. Ltd. Price 4s. 6d. net.

# SCANDIA PROGRESS

## First Production Model Flies : Performance Improved

THE first of a series of ten production-type Saab Scandias soon to be delivered to A.B. Aerotransport (the Swedish section of the Scandinavian Airlines System) is reported to have been successfully test-flown, for a period of 30 minutes, on November 12th. This marks another stage in the career of what promises to be a popular medium-sized airliner.

The test pilot, Captain A. Helgstrand, reported improved take-off characteristics, due to the increased angle of attack made possible by the extension of the nosewheel leg. Reduction in rudder-pedal forces under asymmetric power conditions has resulted from the fitting of a spring tab to the rudder. The decrease in aerodynamic balance has led to an improvement in the self-centring of the control and elimination of the sluggishness which was encountered with the rudder of the prototype. This has also had the effect of improving directional stability.

The introduction of a spring tab on the elevator has considerably improved longitudinal stability at low speeds, thus conferring more pleasant landing characteristics. The test pilot, in concluding his report, said that his general impression was that, from the pilot's point of view, the 90A-2 meets the greatest expectations one might have for this type of aircraft.

Compared with the prototype Saab-90 Scandia (now making a two-month tour of South America, having created considerable interest on its demonstration tour of the United States), the Saab 90A-2, as it is designated, is fitted with the more powerful Pratt and Whitney R-2180 engines of 1,800 h.p. each (with water injection), in place of the original R-2000s installed in the prototype. The R-2180, which incorporates experience gained by the American manufacturers during World War II, is generally considered to be an outstanding engine from the point of view of economy and ease of maintenance.

A great improvement is now claimed in the overall performance of the Scandia, and the cruising speed is said to have increased from 215 to 250 m.p.h. Hamilton Standard Hydromatic four-blade reversible-pitch airscrews are now fitted. Other improvements—incorporated with the object of attaining still better economy in operation—are said to have increased the all-up take-off weight by 4,190 lb, thereby providing a considerable increase in payload.

In anticipation of possible future production under licence in the United States, Saab has also published details of two further versions of the Scandia, designed to cater specifically for the needs of American operators. Designated 90A-3 and 90B-3 respectively, they are primarily distinguished by their increased capacity, namely, 30-38 passengers instead of 24-32 in the 90A-2. The increase has been gained by redesigning the fore and aft sections of the passenger compartment.

In accordance with U.S. standards for an aircraft of this size, the number of crew carried has been reduced from three to two (pilot and co-pilot-radio operator).

It is intended to equip the 90B-3 with a pressurized cabin. This will necessitate redesigning the fuselage, which will then present a more circular cross-section than that of the non-pressurized version. Notwithstanding the slightly increased take-off weight of these latest models, no impairment of flight characteristics is anticipated, and it is expected that the same cruising speed as that of the 90A-2 will be maintained.

## O.U.A.S. ANNUAL DINNER

HELD this year at the Forum restaurant, Oxford, the annual dinner of the University Air Squadron was attended, as usual, by eminent members of the colleges and Services.

The commanding officer, W/C. C. N. Foxley Norris, D.S.O., M.A., in his speech to welcome the guests, broke the news that the Chipmunk was "only just round the corner" and that the Oxford Squadron would be the first unit to have its Tiger Moths replaced. Referring to the War Minister as the cuckoo, and the Territorials as the cuckoo's egg, W/C. Foxley Norris expressed alarm at the prospect of the Squadron being ousted from its town H.Q. nest at Manor Road. The matter, he said, was being taken up by Lord Halifax, the Chancellor of the University and Field-Marshal Sir William Slim, the C.I.G.S.

The C.O. then went on to plead with members of the Squadron to join the R.Aux.A.F. on going down from the University. It was of little use, he observed, to go from the O.U.A.S. to the Reserve and continue to fly *ab initio* types of aircraft. The gap between O.U.A.S. training and Auxiliary standard he assessed at approximately 30 hours on Harvards.

The president of St. John's college, Mr. A. L. Poole, M.A., replied on behalf of the guests, congratulating the Squadron on its imminent re-equipment; he compared its present aircraft with the vehicles seen in the "Old Crocks' Run" and, expressing regret at the possible loss of town headquarters, looked forward to the time when members would be picked up and taken to their new airfield at Kidlington by helicopter.

Air Chief Marshal Sir Guy Garrod, G.B.E., K.C.B., M.C., D.F.C., LL.D., proposing the toast of the Squadron, gave an enthusiastic panegyric on the virtues and joys of flying, and Mr. P. F. H. Emery, Oriel, in replying, revived the pre-war O.U.A.S. tradition of paying tribute to an outstanding figure in the aeronautical sphere; he named Geoffrey de Havilland.

## AUTOMATIC AMBASSADOR

THE excellent flight characteristics of the Airspeed Ambassador (referred to in *Flight's* "In the Air" on October 20th) and proof of the capacity of the Smith S.E.P.1 electric automatic pilot with which it is equipped, were fully demonstrated recently when Mr. George Errington, chief test pilot of Airspeed, Ltd., made a successful take-off and landing using only the automatic pilot controller. This controller, it will be remembered, is, in effect, a miniature "stick" for fore-and-aft control, surmounted by a knob for turn adjustment. No difficulties were experienced, although the aircraft was flying at its maximum all-up-weight.

Two points of interest arise from the demonstration, one involving yaw correction on take-off—when large rudder displacements may be required—and the other concerning the final stages of the full-incidence landing procedure. One of the principles governing the S.E.P.1 automatic pilot lies in the application of aileron to initiate banked turns, co-ordination being achieved by subsequent application of the rudder control. During take-off, yaw corrections are normally required without bank but the automatic pilot naturally applies bank with very small corrections. To obviate this difficulty it would be a simple matter to switch off the rudder control and apply yaw corrections on the pedals during the initial take-off run. However, on the occasion of this demonstration, all three axes of control were left in the automatic position and the accuracy of the corrections made clearly showed the wide range of control provided by the Smith autopilot for all conditions of flight.

During landing no advantage was taken of the fact that the Ambassador is fitted with a tricycle undercarriage, the automatic controller being successfully used to provide a full tail-down landing incidence and to hold the nosewheel off the ground after the actual touch down. A further point of interest was that the reduction of engine revolutions after touch-down (and consequently of electrical power supply) coincided with the moment when backward pressure on the control column would normally have been eased to permit nosewheel contact as speed fell off; thus the automatic pilot completed the landing perfectly (even if quite incidentally at the end of its mission—no autopilot yet being educated enough to taxi an aircraft back to the tarmac or use a fourth control—the nosewheel tiller.

## MERGER REDUNDANCIES

FOLLOWING the recent merger of B.O.A.C. and B.S.A.A., the Aeronautical Engineers' Association states that it has learned that B.O.A.C. has decided to dismiss as redundant 58 per cent of the aircraft inspection staff formerly employed by B.S.A.A., together with an unspecified number of other workers. The Association is said to be protesting to the Minister of Civil Aviation.

B.O.A.C.'s comment on the matter is as follows:— "In the process of merging B.O.A.C. and B.S.A.A. and the concentration of operations at London Airport there has been a general review of engineering staff which has involved reductions in most categories. Discussions with the trade unions on this matter have taken place and they are fully aware of the position."

# CORRESPONDENCE

*The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.*

## CANBERRA EULOGIUM

ONCE in a while a military aircraft appears which, even on its first flight, is quite obviously a "natural." I think the Mosquito has hitherto been the shining example, though it seems that the Canberra is now destined to outshine even the "Mossie" in what, perhaps, is best described as elegant adaptability. Implicit in this description is purity of aerodynamic form and abundance of power, endowing the type with the speed and all-round performance necessary for fighting and reconnaissance duties; tractability in handling, rendering it suitable for night, as well as day, operation; bomb capacity, which, in variants, can be devoted to camera or gun installations (dare one visualize the Canberra with a built-in installation for launching showers of small R.P.s or a lesser number of heavier, homing missiles?); a range beyond the normal expectancy of the type; concentration of the two-man crew (desirable not only in night fighting but all other foreseeable duties); and, above all, that certain intangible, indefinable, quality of excellence, present in the truly great aircraft of the last decade. Among these I number, without hesitation, the Spitfire, Hurricane, Lancaster, Mustang and B-29, though I am hesitant in admitting to such heroic company even the illustrious Beaufighter, Halifax, Typhoon and a dozen others which readily spring to mind. To the Canberra, let us hope, we can look for fulfilment of the functions of the high-altitude and low-level bomber, target marker, night-and-all-weather fighter and (why not?) carrier-borne bomber.

If ever an aircraft deserved to bear the name Churchill it is, surely, this amazing English Electric. Perhaps one of the variants I have visualized will be so honoured.

London, S.W.3. A. THOMPSON.

[The latest Canberra news will be found on p. 700.—ED.]

## AIRLINE PILOTS' PAY

I HAVE read the article "Pilots' Pay" in the issue of *Flight* dated October 13th, and feel that there are a number of statements and inferences contained in it which cannot be allowed to pass unchallenged.

In the first place one quickly appreciates that *Flight* does not look kindly on the existence of B.A.L.P.A. at all. The attitude expressed in that article is all too reminiscent of the spirit that was abroad amongst operators in 1937, when B.A.L.P.A. was formed to protect the interests of the pilots. It is as well for pilots that B.A.L.P.A. was formed and that some of those pioneers did not feel with *Flight* "that the status and the prestige of their profession had been lowered when an organization was set up to negotiate their salaries and terms of employment." It would not be too much to say that without B.A.L.P.A. there would have been *no* profession of airline pilot about which *Flight* can now be "high falutin."

How *Flight* can say that the *majority* of pilots prefer freedom of action as far as seeking and negotiating employment is concerned passes my comprehension. "Seeking" I will grant, but "negotiating" no. How can that be stated when the Association numbers 1,100 members out of an estimated 1,600 U.K. licence holders?

The Association resents and repudiates the suggestion that "they"—whoever they may be—would remain disinterested spectators while a large number of professional pilots lose their employment. The Association is anxious to have as large a membership as possible and for that reason, if for no other, it views with alarm any reduction in the ranks of potential members. But, says the Association, those members must receive "the rate for the job," and it was with that in view that the Association first started its negotiations in the charter companies. *Flight* does professional pilots and the Association a grave injustice by suggesting that B.A.L.P.A. alleges that they would do less than their best if paid less than B.A.L.P.A. thinks they should be. B.A.L.P.A. does not allege that at all. What B.A.L.P.A. says is that it is wrong that because there has been a surplus of pilots certain pilots should have been forced through economic need to fly at rates lower than those which the Association considers reasonable. I have yet to find anyone but the operator himself who considers the B.A.L.P.A. minimum rate to be unreasonable. There is sufficient evidence available in the reports issued by the Accident Investigation Department of the Ministry of Civil Aviation to satisfy all but the biased critic that certain operators have ignored the safety factor in their efforts to secure business. Undercutting of rates, which can only be brought about by operational economies that include cutting down on pilots' salaries, produces a vicious circle which ultimately results in ruining everybody—the good operator and the bad.

Let us, therefore, return to the plain facts of this case. They are:—

(1) B.A.L.P.A. believes every pilot should have his terms and conditions of service clearly laid down in a service agreement.
(2) B.A.L.P.A. is the only organization in the U.K. representing commercial pilots as a negotiating body.
(3) B.A.L.P.A. believes that the terms and conditions of employment as suggested by them to the British Air Charter Association are fair and reasonable and that, having regard to his responsibilities and qualifications, no pilot should operate on lower conditions.
(4) If charter companies are unable to pay their way it is not because of any activities of B.A.L.P.A. They and *Flight* must look elsewhere for their scapegoat.

A. P. W. CANE, Chairman,
London, W.1. British Air Line Pilots' Association.

[Glad as we are to publish this exposition of B.A.L.P.A.'s views, we feel bound to reiterate that a responsible official of the Association did in fact (in a verbal statement to three members of the staff of *Flight*) say that a number of pilots would do less than their best if paid less than B.A.L.P.A. thought they should be. On the wider question, we are only too glad to support any reasonable demand for better pay—but not if such increases (as would at present be the case) had the effect of putting charter operators out of business and, consequently, the pilots themselves out of employment.—ED.]

## FRUITFUL DE-FROSTING?

I WAS interested to see in your correspondence columns for November 24th that a firm of fruit growers was trying to obtain old rotor blades "for air movement to control frosting."

While I am unable to suggest where they could obtain such blades, it is, perhaps, interesting to recall a report, which I believe appeared in *Flight* a few weeks ago, that American farmers had been making use of low-flying aircraft to agitate the chill early-morning air so that its moisture had no chance to condense into frost on a field of wheat.

Though I do not suggest that low flying for any purpose is to be encouraged, is it not possible that local flying clubs would be able to co-operate with fruit growers in some effort of this kind?

The ideal solution, of course, would be to use the warm air from a gas turbine—but think of the cost!

Hatfield. GROUND ENGINEER.

### FORTHCOMING EVENTS

Dec. 15. R.Ae.C.: K.L.M. films, "Caribbean Ahead" and "Batavia Airport" (At Londonderry House.)
Dec. 15. R.Ae.S.: "Navigational Systems and Instrument Aids," by Dr. D. E. Adams, B.Sc., A.Inst.P., and Dr. A. N. Uttley B.Sc., Ph.D.
Dec. 21. R.Ae.S. (Weybridge): "Round the World in 90 days," film by William Courtenay, M.M
1950
Jan. 3. R.Ae.C.: "Round the World in 90 Days" (Part II), film by William Courtenay, M.M. (At Londonderry House.)
Jan. 7. British Interplanetary Society: "The Circum-lunar Rocket," by K. W. Gatland and A. E. Dixon.
Jan. 20. London Aeroplane Club: Annual Dinner Dance.
Jan. 24. R.Ae.C.: "Air Travel through the U.S.A.", film by William Courtenay, M.M. (At Londonderry House.)
Jan. 24. R.Ae.S. (Belfast): "Recent Development in Aircraft Production Engineering," by Prof. Connolly, B.E., F.R.Ae.S.
Jan. 28. Helicopter Association: "Pest Control and the Helicopter," by Dr. W. E. Ripper, F.R.E.S.
Jan. 28. Society of Licensed Aircraft Engineers: "Dowty Electro-hydraulic Systems," by Neville J. Horne.
Jan. 31. Society of Instrument Technology: "Continuous Gauging of Thread or Wire," by L. C. Evans, M. Groneck and H. G. Lee.
Feb. 8. R.Ae.S. (Weybridge): "Aerodynamic Consequences of Flying High and Fast," by W. G. A. Perring, C.B., F.R.Ae.S., A.M.I.N.A.
Feb. 13. Institute of Transport: Brancker Memorial Lecture—A.V.-M. D. C. T. Bennett, C.B., C.B.E., D.S.O.
Feb. 17. Institute of Navigation: "Air Traffic Control," a symposium of papers.
Mar. 24. College of Aeronautics Senior Common Room Society: Annual Dinner.

# SERVICE AVIATION

## *Royal Air Force and Naval Aviation News and Announcements*

### New Auxiliary Commanders

THE Air Ministry announces that S/L. A. C. Henderson, D.F.C., has been appointed Commanding Officer of No. 501 (County of Gloucester) Squadron, R.Aux.A.F., which is equipped with Vampires and operates from Filton, near Bristol. S/L. Henderson enlisted in the R.A.F. in September, 1939, and was commissioned in November, 1940. After service as an instructor, he flew on operations with Nos. 21 and 487 Squadrons from May, 1943, to February, 1944.

While serving as a flight commander with the latter, S/L. Henderson was awarded the D.F.C. for numerous day and night low-level attacks on enemy airfields. In October, 1944, he returned to 21 Squadron after a further spell of instructing, and completed a second tour of operations, for which he received a Bar to the D.F.C.

A second Auxiliary fighter squadron to undergo a change of command is No. 607 (County of Durham), located at Ouston. With the R.Aux.A.F. rank of squadron leader, W/C. J. M. Bazin, D.S.O., D.F.C., takes over from W/C. J. R. Kayll, D.S.O., O.B.E., D.F.C., who now transfers to the R.Aux.A.F. Reserve of Officers. The new C.O. joined his squadron as a pilot in May, 1935, and remained with it until after the Battle of Britain, in which he won the D.F.C.

After a period on Air Staff duties, he returned to operational flying as Commanding Officer of No. 9 Squadron, Bomber Command, remaining with it until the end of the war. The Squadron was engaged upon such special duties as the attack on the *Tirpitz*, and for his part in these operations W/C. Bazin was awarded the D.S.O. He rejoined No. 607 Squadron as Flight Commander in 1946.

CREW TRAINER: Full facilities for "live" training of pilots, navigators and signallers are provided in the roomy fuselage of the Vickers Varsity, and the bulged under-portion accommodates a bomb-aimer and instructor.

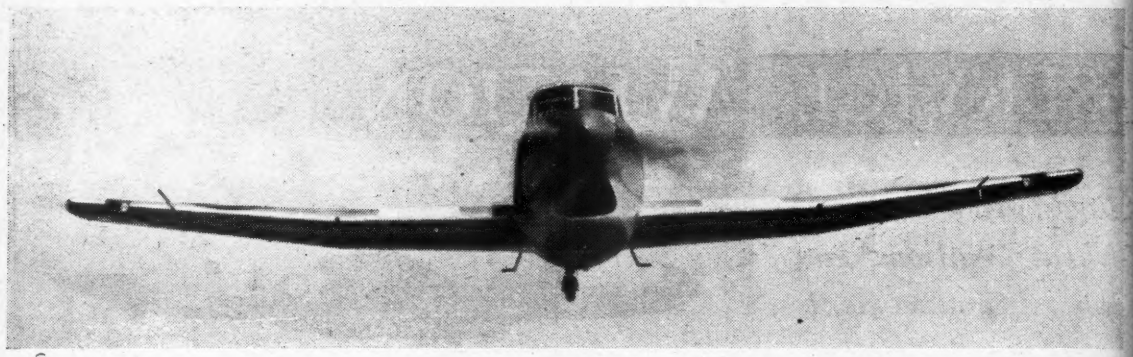
ROYAL DEPARTURE: Two Vikings of the King's Flight carried Princess Elizabeth and her party to Malta recently. Seen wishing Her Royal Highness *bon voyage* is A.Cdre. Sir John d'Albiac, Commandant of London Airport. Also present (left to right) are: Lady Mountbatten, who accompanied the Princess, A.V-M. P. H. Mackworth, of Transport Command, and Marshal of the R.A.F. Lord Tedder.

### R.A.F. Appointments

AIR COMMODORE J. W. F. MERER, C.B., who has been appointed Director of Navigation and Control at the Air Ministry, was, until recently, A.O.C., No. 46 (Transport) Group, B.A.F.O., and Deputy Commander of the Combined Air Lift Task Force. In this capacity he was responsible for the control of all the British aircraft engaged in the Berlin Air Lift, and for his services he was appointed a C.B. in the King's Birthday Honours last June. A. Cdre. Merer, who is 50, was commissioned in the R.F.C. in 1917, transferring to the R.A.F. on its formation in 1918. He began to specialize in navigation early in his career and was awarded the R. M. Groves Aerial Navigation Prize in 1925.

A. Cdre. Philip Jones, Chief Signals Officer of Transport Command since October, 1948, has been appointed Commanding Officer of the R.A.F. Central Signals Establishment. He was previously, for nearly two years, Assistant Director of Telecommunications at the Ministry of Civil Aviation, to which he went in December, 1946, after nine months in the Air Historical Branch of the Air Ministry, writing the signals history of the war. A member of the Institute of Electrical Engineers, A. Cdre. Jones entered the R.N.A.S. at the age of 17 in 1917, transferring to the R.A.F. the following year. He completed a Cranwell cadetship in 1923.

It is also announced that G/C. J. R. Hallings-Pott, C.B.E., D.S.O., A.F.C., has been appointed Deputy Chief of Staff (Air Defence) at H.Q., Air Forces of Western Europe, with the acting rank of air commodore. Until recently he was Deputy Director of Operations (Air Defence) at the Air Ministry. A former Cranwell cadet, A. Cdre. Hallings-Pott



UNIVERSITY TYPE : A new aspect of the Boulton Paul Balliol 2 advanced trainer (Rolls-Royce Merlin 35), examples of which are now undergoing service tests at R.A.F. training establishments.

## SERVICE AVIATION . . .

commanded the R.A.F. stations at Hawarden, Northolt and Biggin Hill during the war, and also served with the North-West Africa Coastal Air Force and the Mediterranean Allied Air Force.

### Aero-medical Appointment

THE Air Ministry announces that Air Marshal Sir Harold Whittingham, K.C.B., K.B.E., F.R.C.P., F.R.C.S., (E.), has accepted the invitation of Mr. Arthur Henderson, Secretary of State for Air, to succeed Sir Edward Mellanby as chairman of the Flying Personnel Research Committee. As a former Director-General of R.A.F. Medical Services, Sir Harold Whittingham has a wide and intimate knowledge of the problems of aviation medicine.

The Committee was formed in 1939 to advise the Secretary of State for Air in all matters relating to the efficiency of flying personnel. It has been responsible for most valuable pioneer work in research on the physiological and psychological environment of aircrew.

In this way, and particularly in regard to the provision of efficient oxygen supplies at high altitudes, the Committee has made an important contribution to the efficiency of the R.A.F. and aviation in general. It has sought to avoid the danger of engineering research outstripping consideration of the vital factors of human capacity and limitations, and has formed the model on which similar research committees have been based in this country and elsewhere.

### Long-range Athletics

AT the annual meeting of the R.A.F. Athletic and Cross-Country Association the executive committee was increased to include one member to look after road-walking in the Air Force. The new member is W/C. F. C. Hornsby-Smith, of Bridgnorth, a road-walker of many years' experience, and veteran of several London-to-Brighton walks.

The R.A.F. seven-mile road-walking championship will be held on March 18th, over a course to be decided later. This championship was first held in 1939, but owing to the war was not held again until 1948. It is run on an inter-station team basis, each station being permitted to enter six athletes, of whom the first four to finish qualify for places. The area elimination races for the 1950 R.A.F. cross-country championships will take place on February 22nd, with the finals at St. Athan on Saturday, March 4th. The inter-command athletic championships will be held from July 3rd to 5th at Uxbridge.

AIR SUPPORT : The Norwegian ship *Norsel* left London last week on its way to the Antarctic, for a two year exploration of the characteristics and resources of Queen Maud Land by British, Norwegian and Swedish scientists. This R.A.F. party, photographed on departure, will fly and maintain two ski-equipped Austers in support of the expedition (left to right) : Sgt. Weston, Cpl. Gilbey, Cpl. Quar, S/L. Walford and F/L. Tudor.

### Culinary Champions

FOR the second year in succession, R.A.F. Station, Wellesbourne-Mountford, Warwickshire, has won the shield for the best airmen's dining hall in Technical Training Command. The competition was inaugurated in 1942 at the same time as the similar, though larger, competition throughout all home commands of the R.A.F. for the Jolliffe Trophy. The shield was handed back to the station by the A.O.C.-in-C., Technical Training Command, Air Marshal Sir John Whitworth Jones, at a ceremony held there on November 22nd.

### Occupational Pastime

GLIDING has become so popular in the British Zone of Germany that the B.A.F.O. Gliding Association (chairman: A. V.-M. C. B. Spackman) now embraces seven gliding clubs with a combined membership of 230 men, women and children. Launched from sites throughout the British Zone, enthusiasts spend many hours of their spare time piloting, or riding as passengers or pupils, in a wide variety of gliders.

At Scharfoldendorf, on the edge of the Hartz Mountains, where the headquarters of the club are situated, five women (two nursing sisters from the R.A.F. Hospital at Rinteln, two W.R.A.F. corporals, and the wife of a member of the club) are among the 35 members. One of them, Corporal May, recently set a record for the longest flight by a woman in Germany since the war when she was airborne in a Grunau Baby 2b for 5 hr 45 min. Chief flying instructor at the Celle Club, in Hanover Province, is F/L. Kenneth Hirst, holder of the British national two-seater distance record, established during the B.A.F.O. gliding contests this year.

At Luneburg (the scene of the Wehrmacht's surrender), the secretary is Flt./O. Howard, of the W.R.A.F. Of the 38 members, not one has experience as a powered-aircraft pilot. S/L. Pelling has made over 900 flights in two years at Luneberg, out of the club's total of 6,500 launches. Members of the Uetersen club, near Hamburg, include two boys aged 13 and 14, sons of a Control Commission official. At Gutersloh, a family fly together; F/L. R. A. Carson, his wife (the club secretary) and their four-year-old son spend their afternoons gliding in a tandem Kranich glider, the boy sitting on his mother's knee. Gutersloh is the base for a mobile repair unit which serves all the clubs.